THE BUILDER

A RECORD OF ARCHITECTURE AND CONSTRUCTION.

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BRIDGES.

WE give elsewhere Mr. Caröe's interesting paper on the bridges of London, a subject which is much in the minds of Londoners at the present time in consequence of the efforts of the South Eastern Railway Company to strengthen the fetters which prevent London from getting rid of an intolerable eyesore which might have been erected with regret if London were nothing else than a purely industrial settlement round a ring of coalpits and the river an enlarged sewage outfall. The Company chose the time to pass their Bill with judgment, because, in the preoccupation created by the war, it was unlikely that the question would receive the exhaustive consideration which might be given to it in normal times. However, thanks to the skilful manner in which the case of the opponents of the Bill was put and to the growing desire among a large section of the public to consider questions affecting London from a broader standpoint, the danger has been averted, though much must still be done if the work of the London Society and the bodies which acted with it is to result in the adoption of a scheme worthy of the great possibilities which are now open to the citizens of London. The weakest argument advanced in favour of the Bill was the suggested wish of the inhabitants of the British watering places to retain the present terminus, since their clear object in so doing would be to cut down the time necessary to reach the central districts of the metropolis, an object which would be far more effectually promoted by the institution of better travelling facilities. If the Company were to have an *index expurgatorius* we could understand how they might wish to suppress the time tables of other companies and to concentrate the attention of the public on the acceleration of their services since the introduction of the first locomotive, as by so doing they might institute a feeling of deep contentment. We are sorry for the shareholders of the line, for we cannot see any way in which their commercial interests can be served unless they can give the people of Kent what the other great lines have given to the districts through which their systems pass. With the exception of a few fast boat-trains, travelling in the south-eastern counties of England is like a return to mid-Victorian methods of locomotion, a fact that all whose business takes them to different parts of the country will recognise, and yet the South-Eastern Company serves one of the most thickly-populated residential districts in England, where many would live if it were not so inconvenient; and if the Company had six termini in London, instead of three, the inconveniences would remain.

The bridge is of all forms of construction the most beautiful, as is evidenced by countless numbers of examples—Roman, mediæval, and Renaissance; but the development of railways occurred at an unfortunate epoch when a great wave of industrial progress occupied men's thoughts and prevented them from dwelling on the by-products involved in concentration on the one-sided development of industry. It is probable that if we could have a list of bridges, old and new, we should find the bridges of the past which were things of beauty were hopelessly outnumbered by the bridges erected during the nineteenth century, most of which we should wish obliterated, if judged by æsthetic standpoints. The most successful of them are probably those which form the great feats of constructive engineering, like the Forth Bridge; and it may be that many of the enormous bridges required must remain purely engineering problems, on account of the urgency of the structural and engineering problems involved. But the great majority of bridges needed in the vicinity of our towns are at once the most prominent of civic monuments and well within the scope of architectural treatment, and the considerations which apply to the design of our public buildings apply with equal or greater force to the treatment of a bridge. No bridge over the Thames involves more purely engineering problems than those which had to be solved in the construction of the New York Municipal Buildings, and it is quite possible to strike a balance between structural and æsthetic considerations which would be acceptable in either case. The consideration of one range of factors alone usually leads to wasteful and unpractical results, however practical in the narrow sense those considerations may seem. Thus the development of our towns during the last century, which was dictated by purely practical reasons, is likely to prove more wasteful and to stand in our way in the twentieth century to a greater degree than the planning of the eighteenth century, which was more in accordance with the broader wants of humanism. The new constructional factor which has come into being with the discovery and use of ferro-concrete has supplied us with a means of building by which we can obtain the advantages of the strength of iron, while eliminating the dangers attendant on the use of a material exposed to the enormous risks incidental in rusting, risks which necessitate the continual application of paint and frequent examination of constructional members and parts. In using naked iron and steel work we are invoking the aid of a giant whose muscular strength is enormous, but whose constitution is one of exceptional delicacy; in using ferro-concrete we are using iron which is, to use a metaphor, secured against constitutional relapses.

We are not advocating the use of ferro-concrete in connection with the construction of a new London bridge, for we see no adequate reason against spanning the river with a masonry bridge; for we cannot argue that the nature of the traffic between London Bridge and Battersea makes an uninterrupted waterway necessary, and of the great æsthetic advantages of a masonry bridge over other forms there can be no two opinions; but ferro-concrete should, we think, be given a first place by our bridge builders wherever it is necessary to ensure great strength with the utmost possible economy. If the forms of many ferro-concrete bridges are unpleasing it is because it has not been sufficiently recognised that pure architecture and pure engineering cannot be separated by any sharp line, and that no solution of any great constructional problem can be effected if æsthetic and structural problems are confined in watertight compartments instead of being treated as necessary elements of the common craft of building. We hope that the lessons of the war, which should have given us a broader outlook and taught us the advantages of united action in overcoming difficulties, will have induced us to think that there may be great advantages to the service of mankind if men of allied professions would work together, as there are few who cannot with advantage learn, and few who have not something to teach, and in none of the great structural work which is required in the modern world is the co-operation of engineer and architect so greatly required as in the solution of the problem of the modern bridge. By such means only can the bridge of to-day be made what the bridge of the past was, the most beautiful and useful of all the works of man.

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Building after the War. BESIDES the question of rating, to which we have already referred, a question which must be dealt with on an equitable basis if building is not to be kept back after the war, there is little doubt that the question of depreciation must also receive the fullest consideration. A building begins to depreciate in value within a comparatively short time of its erection, and the cost of the necessary repairs is a continually increasing factor, which must be provided against by the creation of a sinking fund. It is obviously an unfair burden on building enterprise that no allowance is made for this factor by the income-tax commissioners, and a man who expends largely on building, which is necessary for the community, is treated as if he had created a permanent and fixed source of income. Then, too, it has to be remembered that many buildings are so specially adapted for specific purposes as to have little value for any other. They are a necessary means for the carrying on of a business, but do not represent a source of income any more than does the necessary machinery with which works are equipped. Until such points as these and of the law of rating are dealt with in a reasonable manner, there is every probability that the building which all agree is necessary will be held up because of its increased cost which to a large degree has come to stay.

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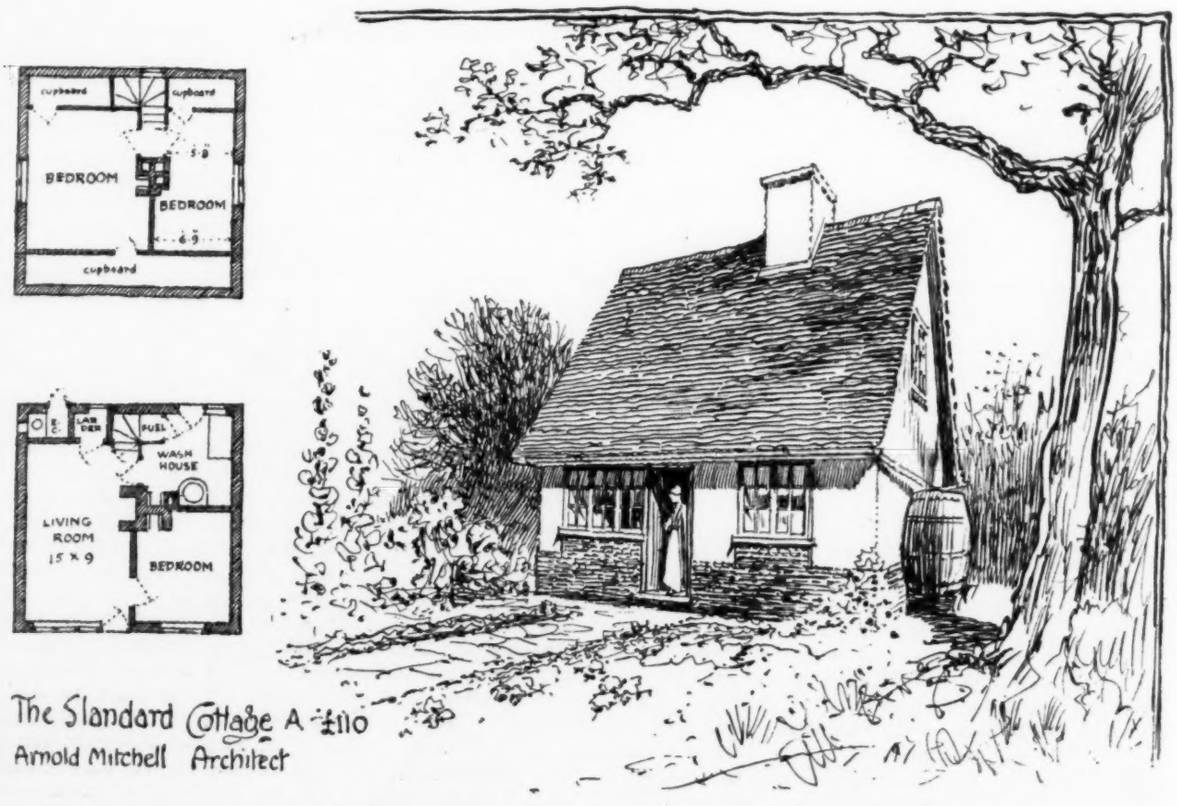

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It so happens—and the historian owes a great deal to her—that on February 11, 1522, Master Thomas Larke was summoned to give evidence at the Guildhall, London, as to the age of a certain lady. In the course of his testimony he stated that his own age was upwards of sixty-six; it would, therefore, appear that he was born about 1456. The next date in his life upon which I can lay hands without doing any violence to its accuracy is 1478, when one "Master Larke" took the degree of bachelor of laws at Cambridge; he would then be about the age of twenty-two. A legal degree allows us to argue that he matriculated at a college devoted to the study of civil and canonical law, such as Trinity Hall, Cambridge, of which he was master from 1517 to 1525. If he was thus versed, as the degree of LL.B. suggests, in canonical law he was appropriately appointed in succession to the archdeaconries of Sudbury, Suffolk (1517–1522), and Norwich (1522–1528), a knowledge of canon law being indispensable before the Reformation to an archdeacon.

In 1494 (according to Blomefield) he was presented by Sir Richard Guildford and Sir Thomas Lovell to the rectory of Foulsham, Norfolk. In the following year, when he would be about forty years of age, he was residing as private chaplain in the house of his patron, Sir Richard Guildford, in the parish of Rolvenden, Kent. I owe the mention of this fact to the "inquisition" already quoted, the subject of which was then a young bride of sixteen with whom he used to converse at table, till it was time to repair to the bedside of her ailing father-in-law. This Sir Richard Guildford was a man of place and power in the reign of Henry VII. In 1506 he went on a pilgrimage to the Holy Land, where he died shortly after visiting the holy places. His chaplain, who accompanied him, wrote a journal of the pilgrimage without introducing his own name into it. It is just possible that this chaplain and diarist was Thomas Larke; at any rate no known date in his career contradicts the conjecture. Until we reach the year 1507 there is nothing—so far as patient research has probed the scanty records of such work—to connect Larke with the profession and practice of an architect. In this year, however, he swims into our ken as the "surveyor of the king's works," who was associated with the completion of the famous chapel of King's College, Cambridge. In the muniment-room of this college a lease is preserved under date of 1507 which grants to him a tenement called the "Boar's Head" in the parish of St. Edward, Cambridge. The lease contains a proviso (afterwards erased) that if he should depart out of Cambridge and "leave the oversight of the king's works there before the expiration of the lease, the same should be null and void." In addition to this lease some six other documents, in which the name of Thomas Larke appears, may be consulted in the pages of the "Architectural History of the University of Cambridge." In three of them the provost and scholars of King's make certain contracts about the vaulting of the stone roof, the finials of the buttresses, and the battlementing of the roof with Wastell, the master-mason. In each covenant it is distinctly stated that the contract is made "with the advice and agreement of Master Thomas Larke, surveyor of the king's works there"; these indentures were executed in the years 1512 and 1513. In another agreement bearing the date of 1513 Larke binds the master-mason under penalties to keep a strict account of the money and goods delivered to him. Towards the close of the year 1515, and at the beginning of 1517, our architect paid certain sums to Barnard Flower, the "king's glazier," to undertake those stained glass windows, which are the glory of the chapel. Barnard Flower died in 1525, and it was our architect who transferred the contract to certain artists in stained glass, Englishmen and Flemings. In both the indentures of 1526 Thomas Larke is described as the archdeacon of Norwich: the architect is identified—that is to say—with the ecclesiastic of the preceding pages. One of the signatures to the contract is that of William Holgill, minister of the Savoy. He had been comptroller of Wolsey's household, and he was such an intimate friend of Larke that he made him "overseer" of his last will and testament. This is one link—and I am about to forge other links—in the chain which couples the ecclesiastic and architect with the great cardinal and statesman.

Many an instruction, and grant of public money recorded in the Letters and Papers of Henry VIII, allude to Larke as the builder of Bridewell and New Hall, assisted by Henry Smith, clerk of the works, after the completion of his task at King's College. But the justifiable curiosity of a historian has led me to search for any evidence, however faint or doubtful, which would associate him as architect of any edifice, secular or sacred, in the reign of Henry VII. It is on record that Robert Vertue, master-mason to the king, made the "plat," or design, for a new part of the palace at Greenwich in 1503 very much after the pattern of the earlier work at Hampton Court. Vertue also built Henry VII's Chapel in Westminster Abbey. I have so far discovered no allusion to the builder of Henry VII's palace at Richmond. I notice, however, that Larke's clerk of works finished one of the towers: possibly, therefore, the architect of Bridewell also drew the "plat" of Richmond palace.

In the letters and despatches of the Wolsey period we encounter Thomas Larke at York, at Hampton Court, or in the precinct of the Blackfriars, where he had a house. In 1526 this house was the theatre of secret negotiations between France and England. So momentous were these delicate negotiations that they resulted later on in a truce with France, and in the gradual estrangement of England from the Spanish alliance. An envoy from France, says Edward Hall, the chronicler, "was kept close in the house of Dr. Larke, prebendary of St. Stephen's, and every day spoke privily with the cardinal, and so secretly he remained till January 24." He was joined on that day in this house by the accredited ambassador of France, who held private conferences with the French party at the court. The Spanish ambassador discovered the secret of the clandestine comings and goings at the mysterious house in the precinct of the Blackfriars, and at once sent a despatch—intercepted by Wolsey—to his master, disclosing the new trend of Henry's foreign policy. Doubtless our architect's private house locked up safely many a secret, which Hampton Court would have shouted from the housetops. The cardinal himself also kept a bedroom in this house, and on one occasion at least Larke arranged a diplomatic interview between him and the king's lieutenant at Calais. From this house on the hill beneath the flashing spire of the church of the Blackfriars Dr. Larke watched the heavy barges unload their cargoes of "hard stone of Kent" or red brick on the quays of Bridewell. Here he sat with Henry Smith, his clerk of works, and Thomas Flower, his assistant, and drew up the estimate for Bridewell to be "signed by the king's grace."

At Cambridge, as in London, Larke must have enjoyed the wit and wisdom of the famous Erasmus. It happens that both Erasmus and Larke were at Cambridge in 1513. In this year Larke and his master-mason were finishing the chapel at King's College, and Erasmus was revealing the natural and historical significance of the Greek New Testament to the tutors and students of the University. Our architect made more than a favourable impression upon Erasmus: he indites in the warmest terms an appreciation of his character and scholarship. "Of all men," he says, "whom I have known in England, Larke is the most cultured and the most sincere." Some four or five years later, when Bridewell was rising but leisurely above its foundations, the bishop of Worcester uses similar language, declaring that "everyone talks of the modesty and virtue" of Larke: there is no reason to ascribe such compliments in either case merely to an anticipation of favours to come.

But it was, of course, well known to everybody that Larke had the ear of Wolsey and that Wolsey had the ear of the king. It is also true that Larke was Wolsey's confessor—at any rate in later years. He is "omnipotent with the cardinal," writes the Latin secretary of Henry VIII to Erasmus. Canon Larke was, indeed, a sort of ante-room, through which all passed who were suitors to the cardinal or his master—needy men of letters, litigants and abbots with bribes in their hands, spies and informers. It is pleasant to think that with all his influence and opportunities, Dr. Larke preserved a reputation for virtue, sincerity and modesty: the cardinal assuredly lacked two of the qualities of his confessor.

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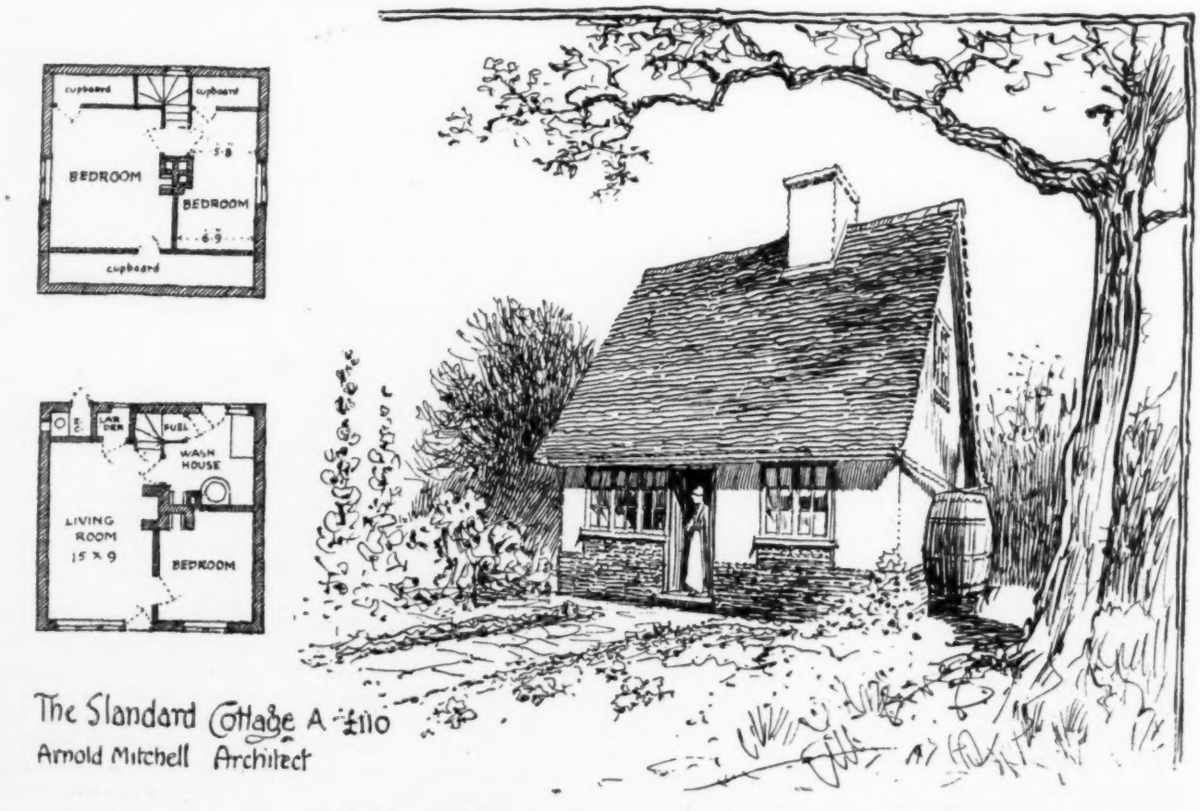

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POLYDORE VERGIL, a contemporary historian, who had a personal grudge against Wolsey, jeers at the cardinal for building Bridewell Palace on the muddy banks of the Thames. It is, indeed, quite possible that Wolsey was the architect of Bridewell in the sense that he may have proposed to Henry VIII a general plan for a new palace on the River Fleet. He was a builder of palaces; he had knowledge and taste. Moreover, he had resided, as we have seen, in the "parsonage" of St. Bride's, and, being on the spot, knew what could be done by an architect with the oblong strip of land lying between Bride-lane and the Thames. But, if it is not premature to use so modern a term, I would venture to suggest that the real architect of Bridewell was one Thomas Larke, an ecclesiastic, who was the "surveyor of the king's works" in the reigns of Henry VII and Henry VIII. In certain documents, preserved in the muniment room of King's College, Cambridge, and in the Record Office, he uses the technical terms of architecture, and signs contracts and estimates, which presume professional knowledge. His may be the hidden hand which designed Hampton Court; in any case he is known to have completed the chapel of King's College, Cambridge, and to have built the palaces of Bridewell, and New Hall (or Beaulieu), near Chelmsford, Essex; and in neither of these masterpieces of architecture is a master-mason, who was generally the real architect, associated with him. The silver plate of William Larke, draper, 1525, of London, was engraved (as his will of 1525 sets forth) with the figure of a lark, and the legs of the same bird find a place in the arms of Thomas Larke. But I am inclined to derive the surname, not from the bird but from the River Lark. This river rises near Bury St. Edmund's, and meanders through Suffolk by Milqenhall, falling into the Ouse near Littleport, Cambridgeshire. I have, indeed, found members of the Larke family at both these Suffolk towns in our period. but the earliest mention of the name occurs in Norfolk records. For example, in the Hundred Rolls of Edward I (A.D. 1274), Hamon, Ralph, and Bartholomew Larke were settled in the neighbourhood of Walsingham, Norfolk. In the following century a Thomas Larke was the rector of St. Peter's, Thetford, and other priests of the same surname were rectors of various Norfolk parishes. In 1463 another Larke is associated with Thetford, which is only ten miles or so from the River Lark: this was Peter, who was twice mayor of the town. He is described in the state papers of Henry VII and Henry VIII as a farmer and grazier. In St Peter's Church there used to be a brass with the inscription:—"Peter Larke and Elizabeth, his wife, on whose souls sweet Jesu have pity." Possibly it was put up to the memory of the mayor and his wife. It seems also as if Thomas Larke, the "king's surveyor," may have sometimes resided at Thetford, for on one of the sills of the old manor house there was carved under a crown the figure of a lark between the initials T and L. Even to-day the Norfolk directory numbers people of the same name among the "private residents" of Yarmouth and Norwich. In any case Thomas Larke was an East Anglian like his patron Wolsey and his friend Stephen Gardiner, bishop of Winchester. Wolsey was born at Ipswich, Suffolk, and Gardiner at Bury St. Edmunds. Wolsey's court must have derived much of its personal devotion and efficiency from the eastern counties.

It so happens—and the historian owes a great deal to her—that on February 11, 1522, Master Thomas Larke was summoned to give evidence at the Guildhall, London, as to the age of a certain lady. In the course of his testimony he stated that his own age was upwards of sixty-six; it would, therefore, appear that he was born about 1456. The next date in his life upon which I can lay hands without doing any violence to its accuracy is 1478, when one "Master Larke" took the degree of bachelor of laws at Cambridge; he would then be about the age of twenty-two. A legal degree allows us to argue that he matriculated at a college devoted to the study of civil and canonical law, such as Trinity Hall, Cambridge, of which he was master from 1517 to 1525. If he was thus versed, as the degree of LL.B. suggests, in canonical law, he was appropriately appointed in succession to the archdeaconries of Sudbury, Suffolk (1517–1522), and Norwich (1522–1528), a knowledge of canon law being indispensable before the Reformation to an archdeacon.

In 1494 (according to Blomefield) he was presented by Sir Richard Guildford and Sir Thomas Lovell to the rectory of Foulsham, Norfolk. In the following year, when he would be about forty years of age, he was residing as private chaplain in the house of his patron, Sir Richard Guildford, in the parish of Rolvenden, Kent. I owe the mention of this fact to the "inquisition" already quoted, the subject of which was then a young bride of sixteen with whom he used to converse at table, till it was time to repair to the bedside of her ailing father-in-law. This Sir Richard Guildford was a man of place and power in the reign of Henry VII. In 1506 he went on a pilgrimage to the Holy Land, where he died shortly after visiting the holy places. His chaplain, who accompanied him, wrote a journal of the pilgrimage without introducing his own name into it. It is just possible that this chaplain and diarist was Thomas Larke; at any rate no known date in his career contradicts the conjecture. Until we reach the year 1507 there is nothing—so far as patient research has probed the scanty records of such work—to connect Larke with the profession and practice of an architect. In this year, however, he swims into our ken as the "surveyor of the king's works," who was associated with the completion of the famous chapel of King's College, Cambridge. In the muniment-room of this college a lease is preserved under date of 1507 which grants to him a tenement called the "Boar's Head" in the parish of St. Edward, Cambridge. The lease contains a proviso (afterwards erased) that if he should depart out of Cambridge and "leave the oversight of the king's works there before the expiration of the lease, the same should be null and void." In addition to this lease some six other documents, in which the name of Thomas Larke appears, may be consulted in the pages of the "Architectural History of the University of Cambridge." In three of them the provost and scholars of King's make certain contracts about the vaulting of the stone roof, the finials of the buttresses, and the battlementing of the roof with Wastell, the master-mason. In each covenant it is distinctly stated that the contract is made "with the advice and agreement of Master Thomas Larke, surveyor of the king's works there"; these indentures were executed in the years 1512 and 1513. In another agreement bearing the date of 1513 Larke binds the master-mason under penalties to keep a strict account of the money and goods delivered to him. Towards the close of the year 1515, and at the beginning of 1517, our architect paid certain sums to Barnard Flower, the "king's glazier," to undertake those stained glass windows, which are the glory of the chapel. Barnard Flower died in 1525, and it was our architect who transferred the contract to certain artists in stained glass, Englishmen and Flemings. In both the indentures of 1526 Thomas Larke is described as the archdeacon of Norwich: the architect is identified—that is to say—with the ecclesiastic of the preceding pages. One of the signatures to the contract is that of William Holgill, minister of the Savoy. He had been comptroller of Wolsey's household, and he was such an intimate friend of Larke that he made him "overseer" of his last will and testament. This is one link—and I am about to forge other links—in the chain which couples the ecclesiastic and architect with the great cardinal and statesman.

Many an instruction, and grant of public money recorded in the Letters and Papers of Henry VIII, allude to Larke as the builder of Bridewell and New Hall, assisted by Henry Smith, clerk of the works, after the completion of his task at King's College. But the justifiable curiosity of a historian has led me to search for any evidence, however faint or doubtful, which would associate him as architect of any edifice, secular or sacred, in the reign of Henry VII. It is on record that Robert Vertue, master-mason to the king, made the "plat," or design, for a new part of the palace at Greenwich in 1503 very much after the pattern of the earlier work at Hampton Court. Vertue also built Henry VII's Chapel in Westminster Abbey. I have so far discovered no allusion to the builder of HenryVII's palace at Richmond. I notice, however, that Larke's clerk of works finished one of the towers: possibly, therefore, the architect of Bridewell also drew the "plat" of Richmond palace.

In the letters and despatches of the Wolsey period we encounter Thomas Larke at York, at Hampton Court, or in the precinct of the Blackfriars, where he had a house. In 1526 this house was the theatre of secret negotiations between France and England. So momentous were these delicate negotiations that they resulted later on in a truce with France, and in the gradual estrangement of England from the Spanish alliance. An envoy from France, says Edward Hall, the chronicler, "was kept close in the house of Dr. Larke, prebendary of St. Stephen's, and every day spoke privily with the cardinal, and so secretly he remained till January 24." He was joined on that day in this house by the accredited ambassador of France, who held private conferences with the French party at the court. The Spanish ambassador discovered the secret of the clandestine comings and goings at the mysterious house in the precinct of the Blackfriars, and at once sent a despatch—intercepted by Wolsey—to his master, disclosing the new trend of Henry's foreign policy. Doubtless our architect's private house locked up safely many a secret, which Hampton Court would have shouted from the housetops. The cardinal himself also kept a bedroom in this house, and on one occasion at least Larke arranged a diplomatic interview between him and the king's lieutenant at Calais. From this house on the hill beneath the flashing spire of the church of the Blackfriars Dr. Larke watched the heavy barges unload their cargoes of "hard stone of Kent" or red brick on the quays of Bridewell. Here he sat with Henry Smith, his clerk of works, and Thomas Flower, his assistant, and drew up the estimate for Bridewell to be "signed by the king's grace."

At Cambridge, as in London, Larke must have enjoyed the wit and wisdom of the famous Erasmus. It happens that both Erasmus and Larke were at Cambridge in 1513. In this year Larke and his master-mason were finishing the chapel at King's College, and Erasmus was revealing the natural and historical significance of the Greek New Testament to the tutors and students of the University. Our architect made more than a favourable impression upon Erasmus: he irdites in the warmest terms an appreciation of his character and scholarship. "Of all men," he says, "whom I have known in England, Larke is the most cultured and the most sincere." Some four or five years later, when Bridewell was rising but leisurely above its foundations, the bishop of Worcester uses similar language, declaring that "everyone talks of the modesty and virtue" of Larke: there is no reason to ascribe such compliments in either case merely to an anticipation of favours to come.

But it was, of course, well known to everybody that Larke had the ear of Wolsey and that Wolsey had the ear of the king. It is also true that Larke was Wolsey's confessor—at any rate in later years. He is "omnipotent with the cardinal," writes the Latin secretary of Henry VIII to Erasmus. Canon Larke was, indeed, a sort of ante-room, through which all passed who were suitors to the cardinal or his master—needy men of letters, litigants and abbots with bribes in their hands, spies and informers. It is pleasant to think that with all his influence and opportunities, Dr. Larke preserved a reputation for virtue, sincerity and modesty: the cardinal assuredly lacked two of the qualities of his confessor.

In the July of 1530, the year of his fall, Wolsey wrote a letter from his palace at Esher to Thomas Cromwell with "weeping tears and trembling hand." In the course of it he alludes to the death of Thomas Larke as recent: our architect therefore would have been about 74 when he passed away. He died in his own house in Blackfriars, and, perhaps, on the "little joined bed," which had once belonged to the good Colet, founder of St. Paul's School. His illness appears to have been protracted, but throughout it he was assiduously nursed by Thomas Flower, who had already been appointed —jointly with Henry Smith—"supervisor of the king's works" in succession to his master.

The will of Thomas Larke was proved at Lambeth on January 15, 1532 (two years after his death), by Peter Larke, one of his executors, to whom letters of administration were granted. A copy of it is preserved at Somerset House, where it is labelled "Prerogative Court of Canterbury, 9 Hogen, 1533." I have extracted it, and now present it to my readers in the spelling and punctuation of to-day.

"I give my wretched body to be buried in the south aisle within the convent church of the Blackfriars in London, where my grave stone now lieth. Also I bequeath to the said Blackfriars in London, for to keep a solemn dirge and mass of requiem for me and for my grave there to be had, and also other observances about my burial, to be divided among them at the discretion of the prior and subprior of the same place £6 13s. 4d. Also I bequeath to the said Blackfriars in like manner, as afore is rehearsed, at my month's day for dirge and masses £3 6s. 8d. Also I have ordained for Richard Lynde, the wax chandler, for wax torches and other necessaries at the day of my burial, and for my month's mind, according to a covenant between him and me made, £3 6s. 8d. Also I give and bequeath to Thomas Flower, my servant, which hath served me many years in my chamber and hath taken great pains with me all my sickness, £5 in money: and over that I bequeath to the said Thomas Flower a little joined bedstead which I bought of the executors of the Dean of St. Paul's, with the little feather-bed of down, and all other apparel appertaining to the same, with two pair of sheets, a pair of blankets, and also one of the little coverings of tapestry work lined with blue buckram, so that he hath one of them, which he will choose. Also I bequeath to William Browne, John Sergeant, Robert Cooke, my old servants, to every of them a feather-bed with its bolster, a pair of sheets, a pair of blankets, with the covering, this stuff to be delivered unto them after the discretion of my executors. The residue of all and singular my goods and debts, whatsoever they be, in this my present testament not bequeathed, I give wholly, freely, and clearly to Peter Larke, my kinsman, and to David Vincent, my late servant, they to have and possess and enjoy all my said goods to their own proper uses and behoofs for ever, without any manner of meddling, interruption, let, contradiction or againsaying of any of my kinsfolk, or of any other person or persons, whatsoever they be. And of the execution of this my present testament, I do make and ordain the said Peter Larke and David Vincent my executors, and I heartily desire that it may please Master Doctor Stephens and Master William Holgill, minister of the Savoy, of their charities to be supervisors and overseers of this my testament."—*From the Quarterly Magazine of Bethlem Royal Hospital.*

Memorial to Old Reptonians.

A meeting was held at Repton School recently to consider the proposed memorial to Old Reptonians who have fallen in the war. Of 1,668 on service, 227 have been killed, 6 are missing, 19 are prisoners, and 294 have been wounded. It is proposed that the memorial shall be of a two-fold nature—a permanent commemoration of some kind in the School buildings and an Exhibition to help the sons of those who have fallen and also the sons of Old Reptonians who cannot otherwise afford the expense.

An ordinary general meeting of the Architectural Association was held at No. 35, Bedford-square, W.C., on Tuesday, the 17th inst., Mr. Henry M. Fletcher, President, in the chair. Work executed by students in the schools during the past session was on view.

The President announced, with deep regret, the decease of the following members of the Association:—Mr. W. W. Crook, Mr. C. L. Wright, Mr. Gerald C. Horsley (Past President), Mr. T. E. Price, and Mr. Howard Chatfeild Clarke. A vote of condolence to the relatives of the deceased gentlemen was passed in silence.

The President, in making a statement with reference to the Association's premises, said that ever since the sale of No. 18, Tufton-street, in December, 1915, the Council had watched for an opportunity to acquire premises in a central situation that should form a fitting permanent home for the Association. The Council had now acquired, through the help and influence of Mr. C. Fitzroy Doll, a forty years' lease of Nos. 34 and 35, Bedford-square. The terms offered by the Bedford Estate, he said, were very favourable, and he believed the situation would commend itself to the majority of the members. Above all, it would give them satisfaction, if they could feel that when the wishes of the whole world are fulfilled and the war is over, those who return will find a place to their own mind in which to forgather and take up the threads of their long-interrupted civil life.

The scheme for the reconstruction of the present premises has been prepared by Mr. Robert Atkinson.

Sir Aston Webb congratulated the Association on leaving Tufton-street and Great Smith-street, and on acquiring the present premises. He thought they could not have had a better place. Sir Aston also congratulated Mr. Fletcher, as President of the Association, and wished him great success in his endeavours. Mr. Henry Lovegrove and Mr. Brodie associated themselves with Sir Aston Webb's congratulations and good wishes.

The Honorary Secretary read letters from Messrs. Walter Cave, Reginald Blomfield, and W. D. Caröe, expressing regret at being unable to be present at the meeting.

The President referred to the By-Law prescribing that all students in the Schools must be members of the Architectural Association. He said that the question had arisen of late whether women could be admitted as students, and the answer has hitherto been that owing to this By-Law it is impossible. Now that other professions and other schools of architecture have admitted women, the Council felt that it was consonant with the traditions of the Association to join the lead in this, as in other architectural matters.

The President moved the following alteration to By-law No. 14:—"That the words 'All Students in the Schools must be members of the Architectural Association' be deleted."

Sir Aston Webb, in seconding the motion, said he did not think there would be any disadvantage in admitting the ladies to their schools.

After a brief discussion, Mr. E. Guy Dawber moved the following amendment to the motion: "That the words run: 'All male Students in the Schools must be members of the Architectural Association.'" Mr. G. H. Fellowes Prynne seconded, and the amendment was adopted.

Replying to a question by Mr. Fellowes Prynne, the President said that the Council would use their own discretion as to who should become members of the Architectural Association.

The President referred to the "Architectural Red Cross Detachment," which is badly in need of funds at the present time, and said that the Secretary, Mr. F. R. Yerbury, would be very glad to receive subscriptions for this special branch of the Association's activities.

All communications for the Association should now be sent to 35, Bedford-square, W.C. 1.

CORRESPONDENCE.

Subways versus Bridges.

SIR,—Mr. Caröe's paper on Metropolitan Bridges favours an opportunity for referring to the alternative subject of Subways. The latter, it is reckoned, are applicable on a plan which the writer, as a student in town-planning, developed some years ago. It is applicable generally in the wide reaches between London Bridge and Sand's End, Chelsea, and great advantages which cannot now be detailed would be derived from such an "obliteration of the river to traffic," as it would mean. It would also save the beautiful Temple, Lambeth, and other expanses from being marred, which bridging means.

It is, however, rather an engineering problem than an architectural one. It consists, first of all, in holding up the return tidal flow at London Bridge, after the method adopted at Richmond nearly thirty years ago, so that the low water level would be raised, say, 10ft., the depth being permanent and uniform; second, in defining and restricting the navigable channel to, say, 400 ft. out of nearly 1,000 ft. available in some cases; third, in the construction of traffic subways underneath, due advantage being taken of the raising of the low water level. Approaches would be formed at right angles to the subways along the foreshores. They might then be of great length and easy gradient. Some might be projected direct, in which cases connecting avenues of first-rate importance would be possible.

The plan ought to be considered also in connection with the proposal to place Charing Cross, Blackfriars, and Cannon-street Stations underground, and, in fact, in relation to a complete and uniform underground traffic system of road, rail, tramway and tube for the Metropolis.

Yours, &c.,

London, July 7, 1917. O. B. I. T.

Project for a Monument.

SIR,—The design of a continental architect is always welcome in your pages, but the proposed monument of Belgian gratitude is open to rather severe criticism. At first glance the design appears graceful and charming, but an examination of the details at once indicates quite wrong principles. (1) The portico of the temple at the base appears to be drawn to a scale of one-sixteenth of an inch to a foot and the remainder of the edifice to one-eighth of an inch scale. (2) It is not permissible to have figures in the same design to quite different scales, except one class be enframed or in bas-reliefs. (3) It would be most unsatisfactory to see a pilaster and entablature treatment adopted for raking lines.

EDWARD W. JENNINGS.

A V.C. Memorial.

A memorial has been placed in York Minster to Major H. A. Carter, V.C., who died in East Africa on January 13 last year. The memorial, which is the work of Mr. Bertram Mackennal, A.R.A., is in the form of a bronze cast on a black marble base, and occupies a panel in the south choir aisle of the Minster.

GENERAL NEWS.

Professional Announcement.

We are informed that Mr. Horace Chesterton has resigned his appointment as District Surveyor of South Battersea and the duties have been taken over by Mr. A. G. Morrice, of 196, Balham High-road, S.W.

Westminster War Memorial.

A meeting of old members of Westminster School has just been held at the school, at which it was decided to raise a Westminster School War Memorial Fund as a permanent memorial to the Westminsters who have given their lives for their country.

Shakespeare Monument in Rome.

A central Committee in London has been formed for the carrying into effect of Mr. Richard Bagot's proposal that after the war the British Empire should present to the Italian nation a monument to Shakespeare to be erected in Rome.

Government Housing Scheme at Clydebank.

Clydebank Town Council have had under consideration a proposal from the Local Government Board to erect 100 cottage houses for the accommodation of workers on an area of between six and seven acres, near Drumry-road, Kilbowie. It is suggested that the scheme might be regarded as a suitable instalment towards the solution of the housing problem in Clydebank, and that the Town Council should undertake to purchase the properties either at the actual cost of the buildings, less an agreed percentage, or at a valuation to be made on a date after the termination of the war.

The Housing Question at Stourbridge.

The Mayor of Stourbridge, presiding at a recent meeting of the Council, announced the receipt of a letter from the Local Government Board enquiring whether, in the matter of a scheme for provision of houses for the working classes upon which there had been previous correspondence, any provisional agreement as to the acquisition of a site had been entered into. He moved that the Clerk be empowered to reply that the Council had already acquired a site. This was seconded and agreed to, and further enquiries from the Local Government Board as to plans and a provisional estimate were referred to the Housing Committee.

Proposed Aberdeen War Memorial.

Aberdeen Town Council recently considered a motion to enlarge a remit already made to the Finance Committee in order that they might consider and report upon the propriety of taking steps for the erection on a central site of a permanent memorial worthy of the city for those belonging to Aberdeen and the counties of Aberdeen, Kincardine, and Banff, or associated with the local Territorial units, who have during the war laid down their lives for their country. It was proposed that the memorial should be erected on a site at the corner of Blackfriars-street and Woolmanhill on property belonging to the Town Council, adjoining the Art Gallery. A remit was made to the Finance Committee to consider and report on the proposal.

Use of Creosote Prohibited.

The Minister of Munitions has made an Order (dated July 13) prohibiting except under and in accordance with the terms of a licence issued under the authority of the Minister of Munitions, the use of creosote (whether as a solvent or otherwise) for or in connection with :—

(i.) The water-proofing, preservation, or treatment of timber or wood of any kind or description.

(ii.) The manufacture, repair, preservation, or treatment of any road or path in the United Kingdom, or any part of such road or path.

No person shall until further notice offer to sell, or, except for the purpose of carrying out a contract in writing existing before the date of the Order for the sale of creosote, enter into any transaction or negotiation in relation to the sale of creosote, except under licence from the Minister of Munitions.

Nottingham House Builders' Association.

At a general meeting of the house builders of Nottingham and district, a branch of the National Federation of House Builders was formed, and the following officers were elected : Mr. George Sadler (president), Mr. George Lovett (vice-president), Mr. T. Pepper (hon. treasurer), Mr. J. Squires (hon. secretary), and a representative committee. The federation, of which Mr. Sadler is vice-president, emphasises the imperative need for more and better housing accommodation, and claims that there is no practical manner in which it can be supplied except through the medium of the house builders of the country, who have erected approximately 90 per cent. of the houses in the past. Energetic steps will be taken to bring this home to the Government, and the federation will strenuously oppose all state and municipal housing schemes, which they consider are contrary to the welfare of the people.

The National War Museum.

We have received the following from the Committee of the National War Museum, H.M. Office of Works, Storey's-gate, S.W. 1.

The Committee of the National War Museum are anxious to make, as far as possible, a complete history of the war in photograph. Such a record should be of permanent historic value and European importance. Efforts to obtain similar national collections are now being made by all the other belligerents. We wish, therefore, to make a strong appeal to all friends and relations of officers now serving, or who have at any time served with H.M. Forces during this present war, for free gifts of bromide photographs. Such photographs should be unmounted and printed on bromide paper ; this in order to facilitate docketing and to secure their permanence. If the donors will write on the backs of the photographs they contribute such details as will form a minute concise biography, with dates of promotion, distinctions, &c., they will very materially assist the Committee. All photographs received will be duly acknowledged, and we feel that our appeal has only to be generally known to meet with an adequate and cordial response.

Properties for Sale.

Amongst the more notable properties that have just been placed in the market are : Tower Cressy, Campden-hill, Kensington, and the garden grounds of about 15,000 ft. super. This property, situated in Aubrey-road, occupies a commanding position upon the top of the hill, and the turret forms a conspicuous feature in the view as it rises above the trees around. The house was built for his own occupation by Thomas Page, the civil engineer, who died forty years ago. He adopted for the design a quasi-Gothic style, in honour, it is said, of the Black Prince, and as leaseholder was required to hoist a flag upon every anniversary of the battle of Crécy. The meeting Hall Estate, near Brandon, Norfolk, consisting of nearly 6,000 acres, and including the manors of Bromehall, Weeting, Southall, Crocketts, and Hockday. On the property are the remains of the Augustinian Priory of St. Mary, founded at Broomhall *temp.* John, which Pope Clement VIII granted in 1528 to Cardinal Wolsey, also the ruins of the moated castle built in the eleventh century, with the Grimes Graves, the dyke known as the Devil's Ditch, and meeting Cross, whither the pilgrims resorted when they visited the shrine of Our Lady of Walsingham.

Use of Timber for Road Works.

The Local Government Board has addressed the following circular to local authorities :—

"I am directed by the Local Government Board to state that their attention has been drawn by the Controller of Timber Supplies to the grave difficulties which now obtain in regard to the provision of timber to meet the enormous present and prospective demands for purposes of national importance and to the urgency of reducing to a minimum the consumption of timber for all but the most essential needs. It is strongly urged that the use of timber for road works should be confined to the sole purpose of repairs, that the relaying of all wood paving should be deferred for the present, and that where works for the improvement of road surfaces cannot possibly be postponed the local authorities should adopt some alternative method, such as surfacing with asphalt or other bituminous material, or taking up a section of sound wood paving, which could be replaced with setts, and using the blocks thus set free for repairing worn-out places. Economy in the use of timber has a very special bearing on the problem of saving tonnage at the present time, and in bringing these suggestions to the notice of local authorities the Board feel sure that they will fully appreciate the seriousness of the position and do all in their power to give effect to them."

The Rebuilding of Dublin.

Intimation has been received in Dublin from the Government of their intention to release large quantities of timber for use in the carrying out of the housing schemes of the Dublin Corporation, and also for use in the reconstruction of buildings destroyed during the rebellion.

A conference of Irish quarry-owners and their representatives was held at the offices of the Dublin I.D.A., Dawson-street, recently, to consider how the use of Irish stone may be furthered, particularly in the rebuilding of Dublin. Major Crean, who presided, said the question had become so serious of late, they had sought the assistance of the Institute of Architects of Ireland, and they had formed a joint committee, which had done considerable work in approaching building owners and the Lord Mayor. The Lord Mayor was in thorough sympathy with rebuilding O'Connell-street with stone—if not wholly, at least the dominant features of it. Major Crean added that, apart from stone required in the building of the destroyed areas and throughout the country generally, there is an immediate prospect of large demands from the Continent. Already inquiries from Belgium for stone are afoot. Mr. P. J. Lynch, Institute of Architects, said machinery was the great thing needed to enable the quarries to compete with others. Lord Monteagle said the great difficulty was the uncertainty of the demand and the consequent uncertainty of the labour supply. Mr. Aherne (Ross Quarry, Cavan) believed that the people wanted O'Connell-street built of stone. Mr. Montague (London) said that England imported every year 33,000 tons of marble, only 5,000 tons of which came from Ireland. The reason was that it could not be got at the times it was required, though the material was equal to any form Italy and Greece. A committee was formed to regulate all questions affecting quarry-owners

The Royal Sanitary Institute.

The following have recently been elected by the Royal Sanitary Institute :—*As Members* :—P. Banerjee, B.E., Cal. Univ., Dt. Nadia, Bengal India ; R. K. Brown, M.D., D.P.H. (M.O.H.), London ; G. F. Buchan, M.D., D.P.H. (M.O.H.) London ; M. Hainsworth, M.I.Mun. & C.E., Teddington ; *N. W. Hoskins, London ; B. H. Knight, London.

As Associates :—‡Miss M. McKenzie Crooks, Treharris, Glam. ; ‡Miss C. B. Ellis, Stoneygate, Leicester ; ‡J. Evans, Pontardulais, Carmarthen ; ‡Miss L. Gwynne, Swansea ; ‡G. Hill, Belfast ; ‡T. L. James, Swansea ; †Miss M. E. Leadbeater, Sheriff Hutton, near York ; ‡G. E. Lee, Leeds ; †Miss G. Preshous, Shrewsbury ; †Miss M. Ross, Durham ; ‡P. Steadman, Stafford ; ‡Miss L. Stevens, Stamford ; ‡Miss G. A. Stott, Manchester ; ‡Miss M. Tait, Lancaster ; ‡Miss L. West, Nottingham ; ‡Miss H. E. Williams, Treharris, Glam.

* Passed the examination of the Institute in Sanitary Science as applied to Buildings and Public Works.

† Passed the examination in School Hygiene, including Elementary Physiology.

‡ Passed the examination of the Institute for Inspectors of Nuisances.

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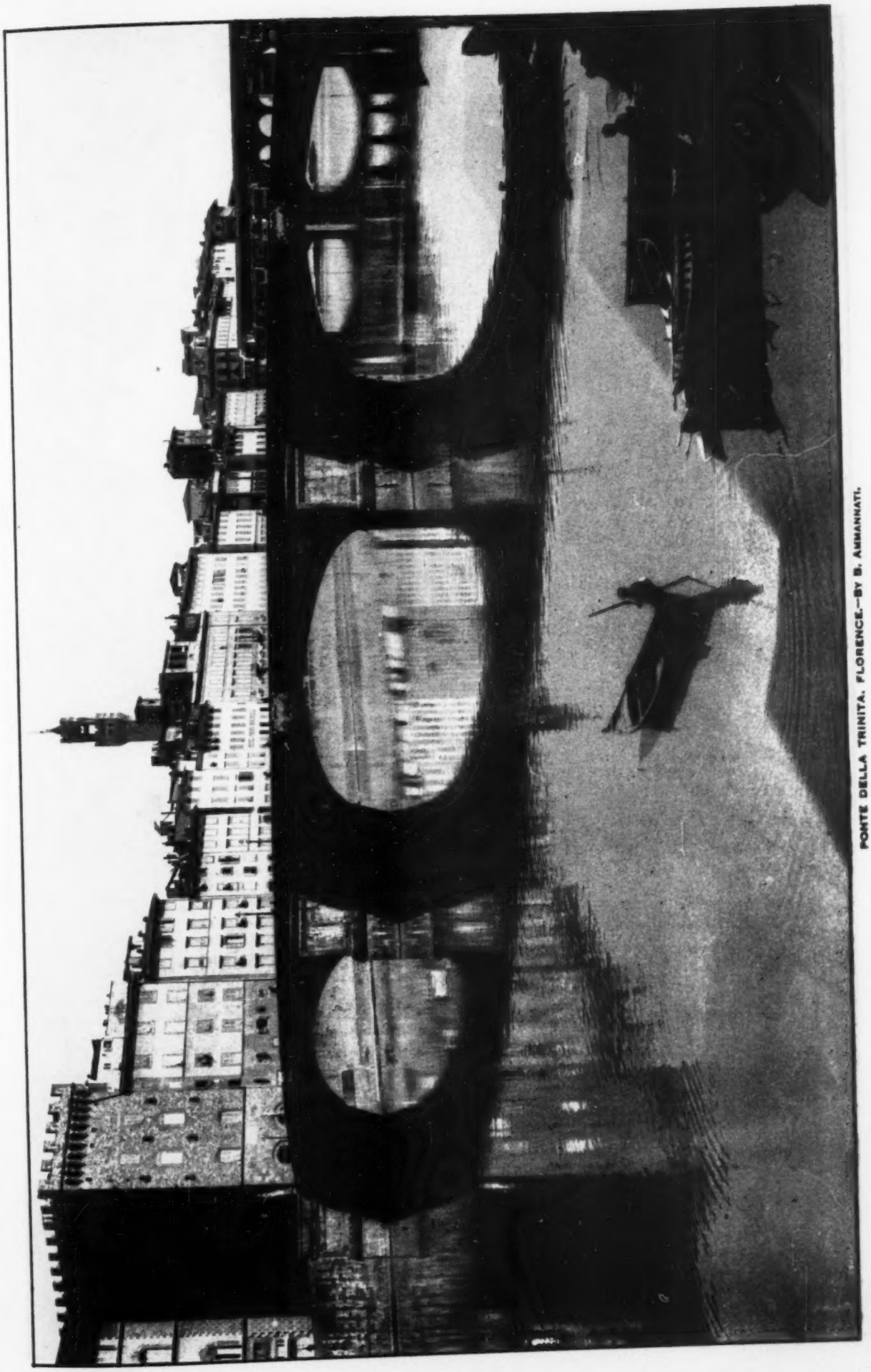
ILLUSTRATIONS.

OUR illustrations are all devoted to examples of bridges, both mediæval and modern, which show the great importance of the bridge as an architectural feature and its æsthetic possibilities, whether expressed in the form of masonry or in more modern types of construction, an importance which cannot be overestimated. We hope the time will come when bridges once more will be considered, as they were in the past, as architectural monuments; for in their design the skill of the engineer can be fully utilized without eliminating the skill of the architect.

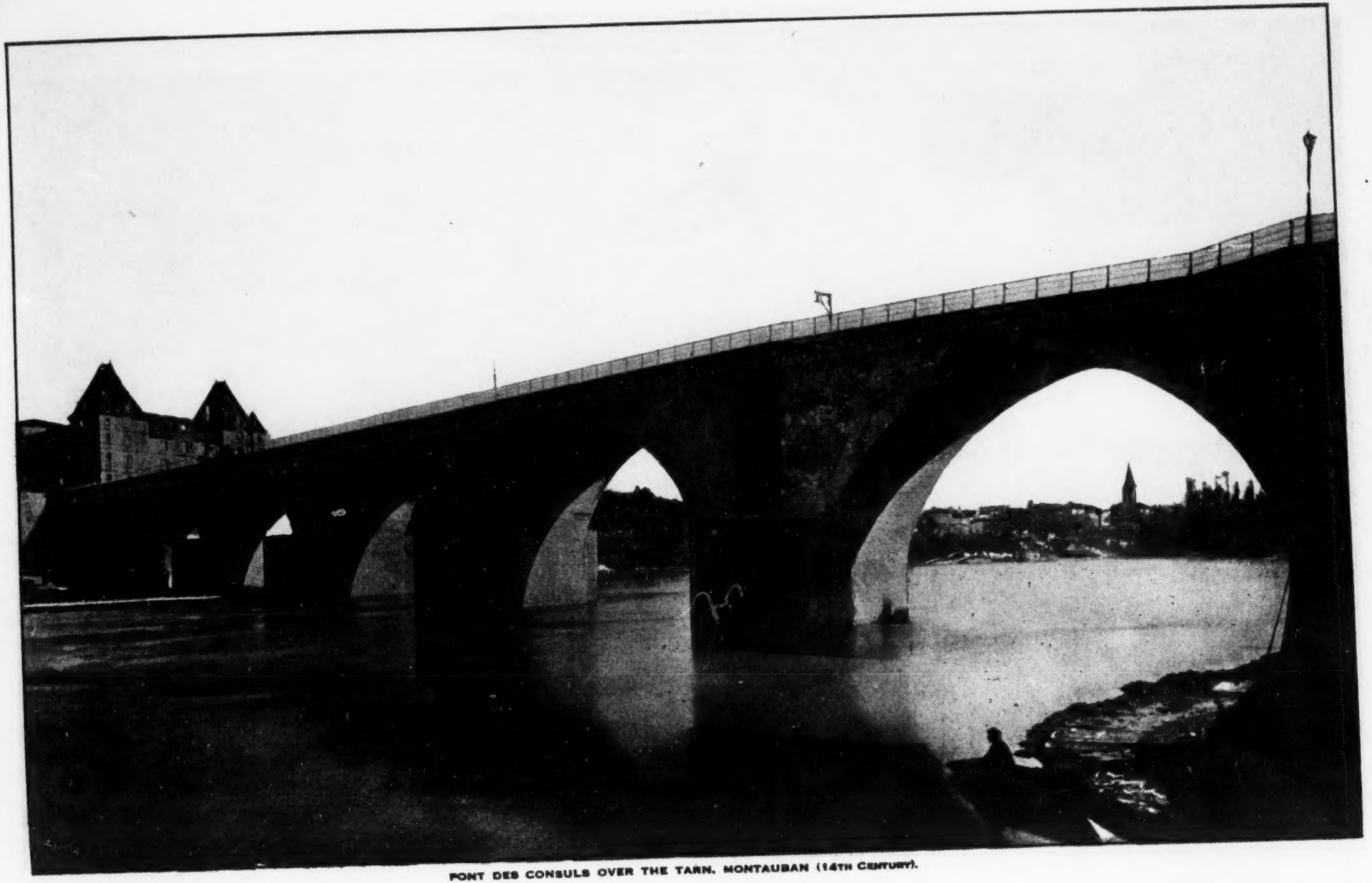
Government Housing Schemes.

It is stated that the question of adopting a housing policy for the whole country after the war is now engaging the close attention of the Government. The Local Government Board early recognised the necessity of getting schemes prepared, in order to be in a position to deal effectively with the situation at the end of the war.

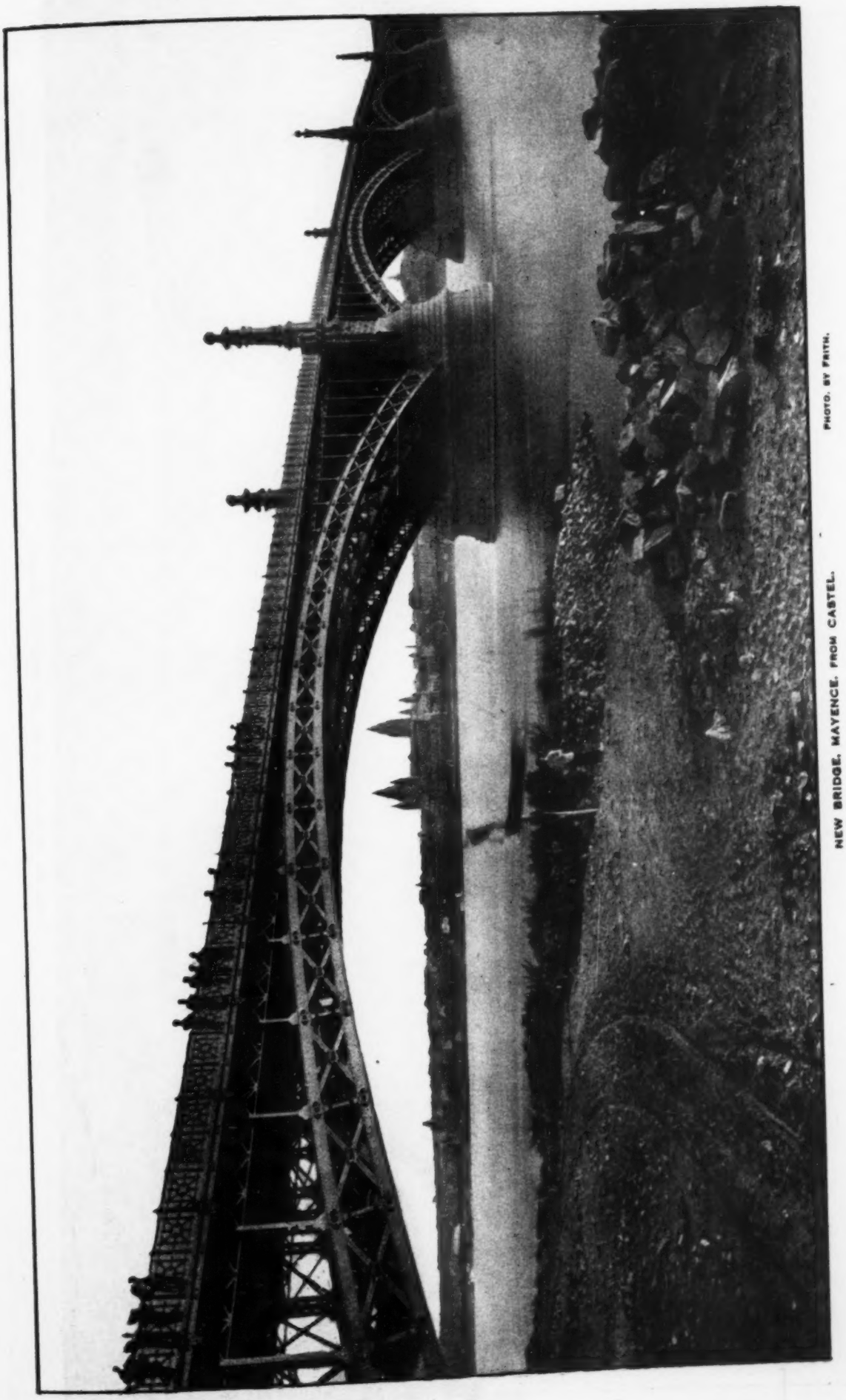
Two Bridges. From a drawing by the late H. W. BREWER.



PONTE DELLA TRINITA, FLORENCE.—BY B. AMMANNATI.

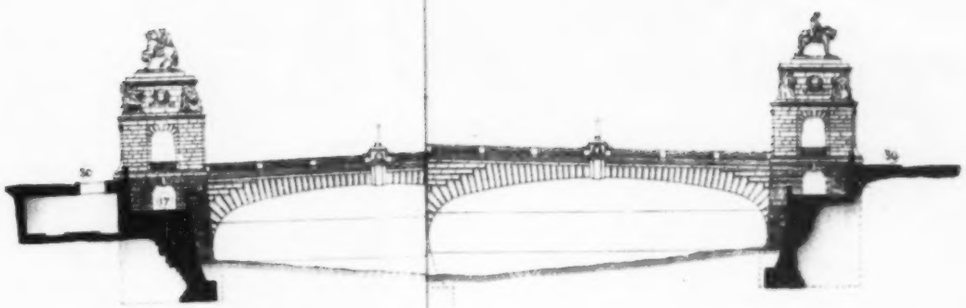


PONT DES CONSULS OVER THE TARN, MONTAUBAN (14TH CENTURY).



NEW BRIDGE, MAYENCE, FROM CASTEL. PHOTO. BY FRITH.

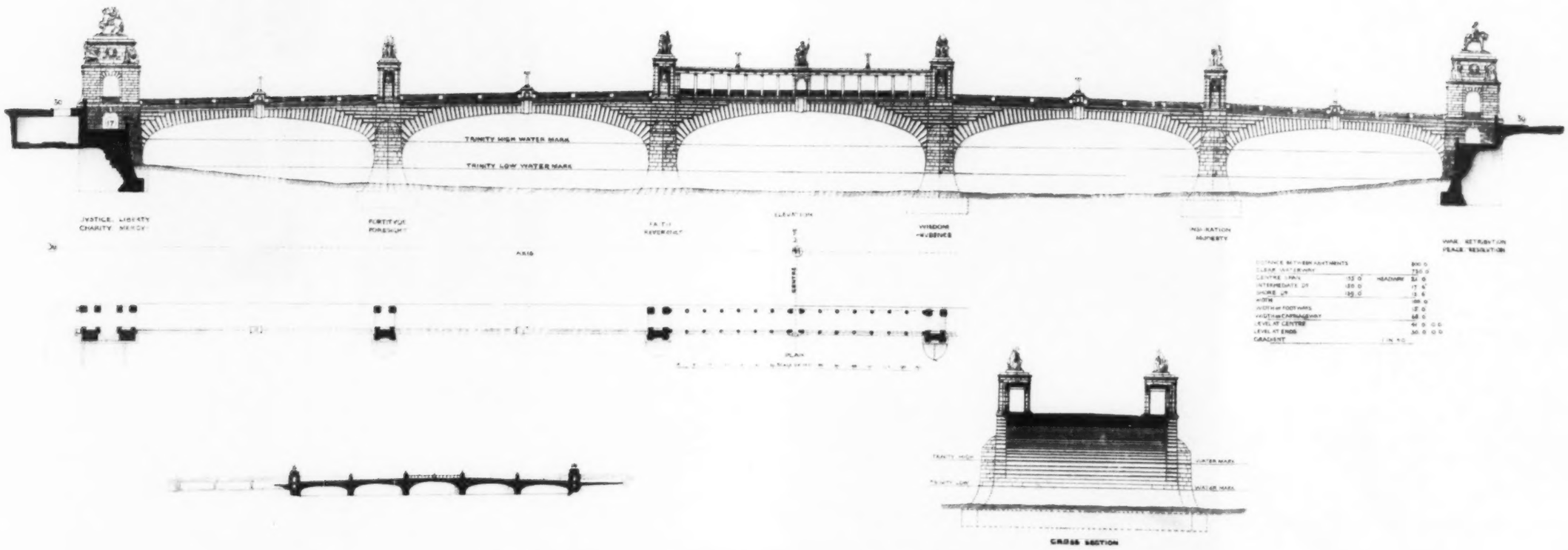
PUENTE DE SAN JUAN DE LAS ABADESAS, GERONA.



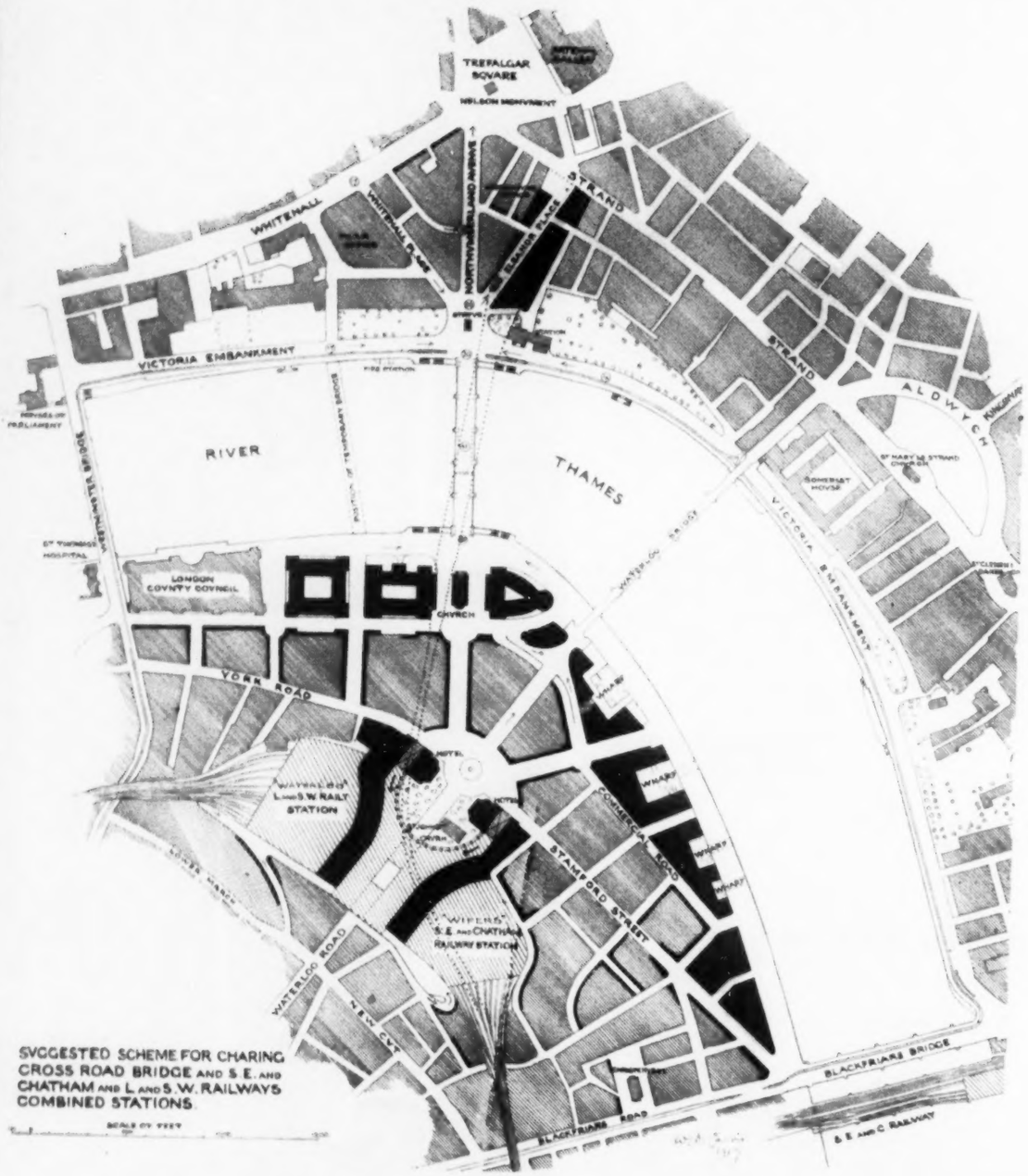
JUSTICE LIBERTY
CHARITY MERCY

WAR RETRIBUTION
PEACE RESOLUTION

DISTANCE BETWEEN ABUTMENTS			800 0
CLEAR WATERWAY			730 0
CENTRE SPAN	152 0	HEADWAY	34 0
INTERMEDIATE SP	120 0		17 6
SHORE SP	105 0		13 6
WIDTH			100 0
WIDTH OF FOOTWAYS			15 0
WIDTH OF CARRIAGEWAY			68 0
LEVEL AT CENTRE			44 0 O D
LEVEL AT ENDS			36 0 O D
GRADIENT		1 IN 40	



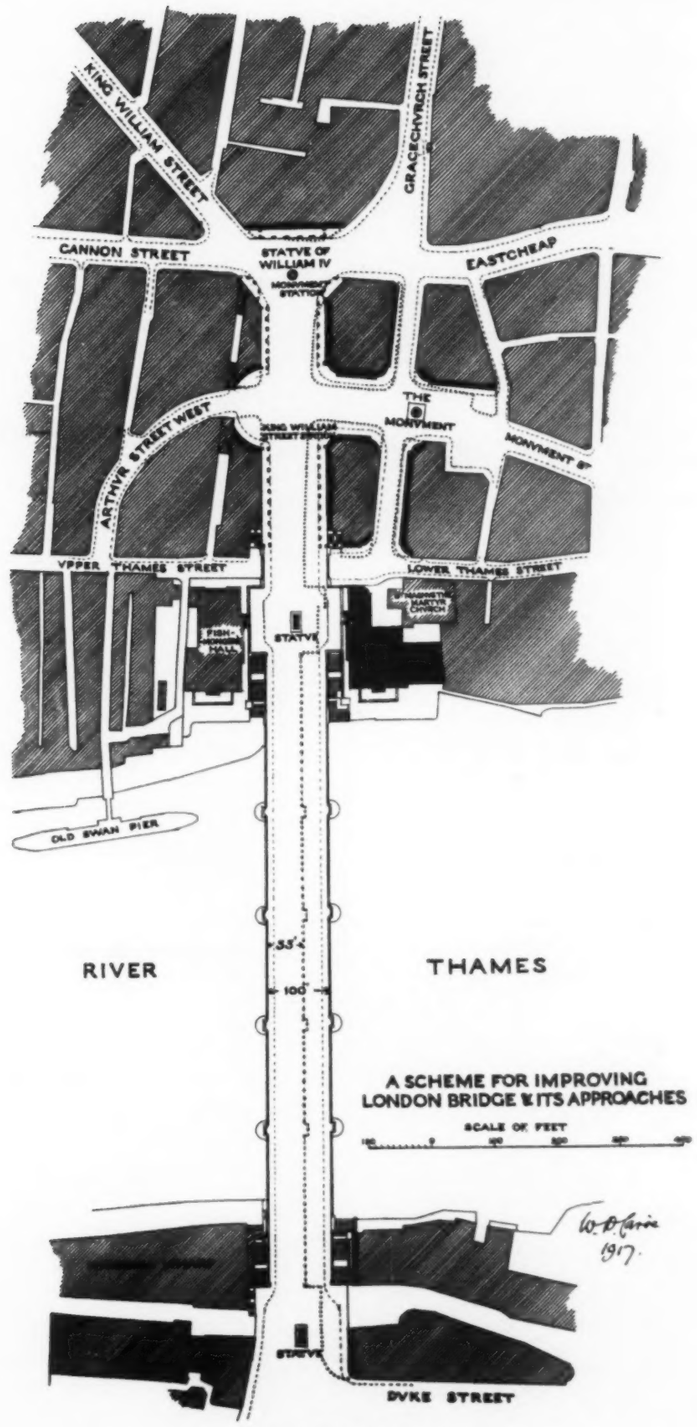
STUDY FOR A WAR MEMORIAL BRIDGE AT CHARING CROSS.—Drawn by Mr. W. D. Caröe, F.R.I.B.A.



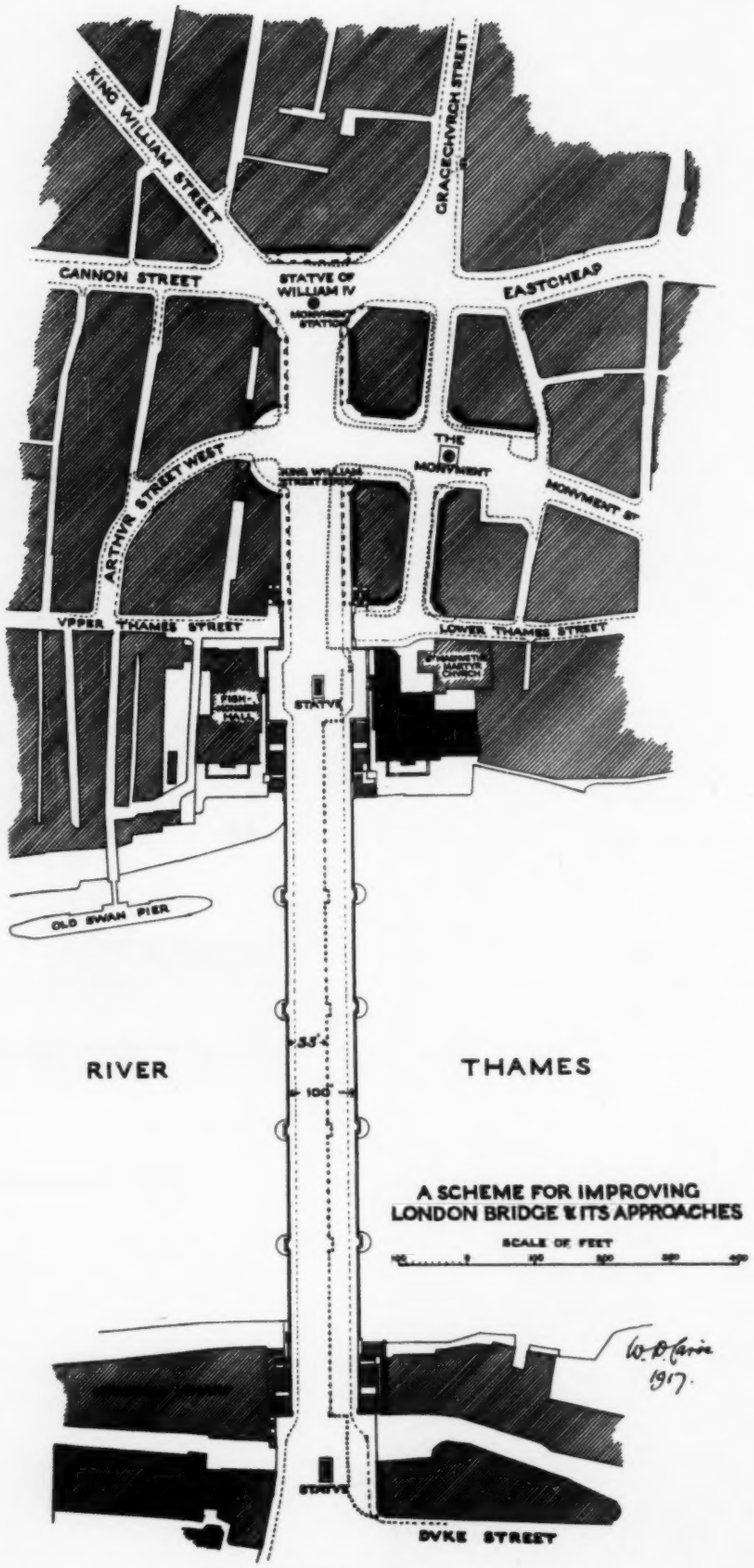
SUGGESTED SCHEME FOR CHARING CROSS ROAD BRIDGE AND S.E. AND CHATHAM AND L. AND S.W. RAILWAYS COMBINED STATIONS

SCALE OF FEET

DRAWN BY MR. W. D. CARÖE, F.R.I.B.A.



DRAWN BY MR. W. D. CARÖE, F.R.I.B.A.



DRAWN BY MR. W. D. CARÖE, F.R.I.B.A.

LONDON BRIDGES.*

BRIDGES, so to speak, are in the air: Southwark Bridge now being rebuilt; St. Paul's Bridge, so far beyond the stage of projection that there are even critics who declare that a fiasco is upon us; Lambeth Bridge, rapidly falling to pieces; while the relief of the Thames at Charing Cross from present degradation and a new Charing Cross-road Bridge, as a great war memorial, are as close to our hearts as any London improvement ever was.

I am aware that there are many members of the London Society who could have dealt with my subject with far greater authority than I am able to command, but I yield to no one in intense interest in a branch of architecture which has always held me. Why? I cannot say, but if I may touch upon a personal note, long after my interest in the subject had developed almost into a passion, I discovered, hanging in the Town Hall of his native city, a portrait of an early eighteenth century ancestor, to whom the honour of a public portrait was accorded, as is related upon the picture, because he was a great projector of bridges, and consequent benefactor to the community.

Is there any development of the art more directly useful and practical, or more definitely capable of combining grace and beauty with use and dignity, than the bridge of arcuated form? Here are no complicated trammels of planning, but wide interests of construction, capable of being reduced without loss of art to an exact science. Not for a moment do I suggest that a trabeated bridge is incapable of architectural success. But those monumental builders, the Romans, taught the world how the arch lends itself to bridge construction in the grand manner, and, even when translated into his favourite metal, the modern engineer, apt to think in steel trabeation, has discovered the arch's utility. The mediaevalists were masters of the arch or vault; the arch came to them as by instinct, and of course was used freely in their bridges, often with great art. Their work above ground was indeed generally admirable in design and execution. It is unfortunate—indeed inexplicable—that they failed so often in their work below ground. It happened that many of their constructions, particularly bridge constructions, laid in the beds of rivers, failed owing to a lack of science in fundamentals. But we have fortunately many of them still left to us.

Now, I am making no extravagant statement in claiming that in a city like London, whose situation and lay-out are initially due to and dependent upon the river, there is no definite architectural feature better able to combine in the fullest sense those qualities which make for monumental success in architecture than a bridge across the Thames. If well disposed and laid out—an obvious essential—it is seen or ought to be, from all sides, whether in connection with the river banks or from its flanking neighbours. In that sentence we condemn at once all bridges which can be classed as selfish and obstructive bridges, such as unduly confine the vista by their own existence. It would no doubt be a very valuable commercial investment to erect immediately round St. Paul's Churchyard a complete environment of New York skyscrapers loftier than the lantern which caps Wren's inimitable dome. Even such would not vie with modern New York's normal. In the narrow alleys between such constructions, to which the existing streets would be by comparison reduced, the dome of St. Paul's would appear like a periwinkle girdled by whelks. Now those I should call selfish, obstructive or destructive buildings. Fortunately for us, our building laws at present block the way. And I would press the analogy in respect of bridges old and new over the Thames. Bridges are not only to be considered as units, but each one, in its practical purpose, be it for road or rail, as part of one collated and calculated system of communication from bank to bank, equally inter-relative as a system of monumental architectural expression, without which no city of a great and historic race is worthy to be other than a city of the dead, or worse than dead—decrepit, mentally and bodily—unfit. I do not think anyone here will dispute my premises.

But before leaving the general question, I would refer once more to the qualities of grace and line, which do not exclude those of power and stability—all of them capable of expression in fine bridge building. No better text upon the subject could be found than the following:—

"Beauty does not require ornament or expense, but demands, what may be more difficult to supply, correct taste in the designer."

Those words at the opening of an able treatise upon bridge building go to the root of the matter. Before confining ourselves to the individual bridges of London, a word as to Thames side. Watling-street crossed the Thames at Westminster, where it was broad and shallow, fordable at low tide. London Bridge is where it is because it was quite natural to bridge the river at its narrowest part. There were low tide fords, below as well as above; but the approaches were difficult because of the wide area of swamps over which the shallow water spread itself out. The existence of the shallow ford and easy crossing, no doubt, determined the position of the City of Westminster, just as the protection of a deep crossing determined that of the City of London. On these two bases, London and its outgrowths have built themselves up. In this respect London is vastly different and vastly superior to Paris, where the Seine, important though it is, must be classed as a mere canal in comparison with the tidal Thames. Art or imagination could not have set out a grander ogee sweep of water than the Thames from Chelsea Reach to the Pool. Particularly as it sweeps past Westminster and the rapid bend whereof Charing Cross Railway Bridge almost forms the meridian, its possibilities are infinite with the transverse lines converging towards the blunt point of the Surrey shore. And there is no natural island in our Thames corresponding with the Ile de la Cité, Paris. Nature has thus made our river majestic in its elements. It remains only for man to consummate nature's handiwork, as befits the monumental development of a great city centre of Empire. On these grounds I have no hesitation in confessing myself at once a sceptic, or, if you will, a heretic, as to the views of those sentimentalists who would preserve and protect the Surrey side mud flats for what they are. Pepys and Evelyn enjoyed them as luxuriant tree-decked shores, save only where the branch road from Southern Watling-street debouched on London Bridge and clustered dwellings along it. The Thames was silver then and supplied London direct, not only with her fish, but with her drinking water. Thames side, owing to the barrier of London Bridge with its locks and lashers, was virtually a fresh water lake, held up just as the reach below Teddington is now contained by its half-tide barrier.

We envy Pepys and Evelyn. Were the greenery there now, we should cry out for what must have rejoiced them by the best of all harmonies—the harmony of contrast. But the mud flats of Southwark and Bermondsey are vastly other to-day. They are essentially artificial, precisely in the same sense as the colour of Thames water is artificial—man made. As well keep Thames water filthy instead of silver as wish to preserve what is but an outgrowth of the seamier side of modern commercialism in its proverbially callous treatment of nature. One feels there is an intimate relation between the Commercial-road and the Surrey mud flats.

I am not straying from my subject in the least. Upon the treatment of the Surrey shore to a large extent must depend the design of any new bridges abutting upon it. What is needed upon the part of both London and Southwark to-day is an active practical interest in this question which concerns each of them equally and both of them jointly. If the interest is wide enough and intelligent enough, some definite advance worthy of London will doubtless be made. The object of this paper is to stimulate interest by re-stating axioms and resolving facts, albeit trite, to those in this room and outside it who have given thought to the subject, or who care for their London.

It will, perhaps, be convenient not to take the bridges in the order of their building, but to begin at the Pool and work upwards, ending at Battersea, particularly as we thus make early acquaintance with by far the most historically interesting of all the bridges—London Bridge. If I dwell upon bridges that are definite works of architecture, my calling and predilection will be my excuse.

The Tower Bridge (SIR J. WOLFE BARRY, 1886–1894).

The Tower Bridge comprises so wonderful a piece of hydraulic engineering that all the foresight and provision made at vast cost to supplement its hydraulics have now been allowed to go out of use—indeed, need never have been. As an observation post, I am told, have its steel founded towers and turrets for the first time come into their own. And with this mead of unstinted praise for its mechanics, I hasten from a structure boasting no qualities to be classed as architectural, to another bristling with architectural as well as historical interest.

London Bridge.

(PETER OF COLECHURCH. 1176–1209.)

We must perforce hasten unduly over the long history of London Bridge, so rich, so teeming in incident that it would need several such lectures to do it justice. Those who are prompted to a deeper study will find it admirably set forth in Mr. Welch's book, where full justice is also done to the Tower Bridge.

Of the form of the first, a wooden bridge, no record subsists. Said by Stow to have been erected in 993 by monks of St. Mary Overies, Snorro Sturlesen tells us that it was held by the Danes and attacked by King Ethelred, with Saint Olaf of Norway as his ally. Olaf is stated to have sailed up the Thames and destroyed the bridge in 1008. His memory is still with us in Tooley-street—St. Olaf-street. The bridge was rebuilt and again destroyed, Rufus the King interesting himself in its reinstatement. The next bridge was, according to Stow, also of wood, but was partly destroyed by fire in 1136, and repaired by a citizen too little known and honoured, Peter, the priest of St. Mary Colechurch, in 1163 as a temporary measure, pending only his erection of the first stone bridge, begun in 1176, finished in 1209. It had twenty arches with massive piers, of which one of the pier foundations, called the starlings, stretched out no less than 115 ft. in total length. The bridge was 926 ft. long, only 15 ft. wide, and 60 ft. high, the greatest arch span 32 ft. The total waterway was, however, only 194 ft. There was one drawbridge. On the eastern side of the long centre starling Peter erected at his own cost a chapel and dedicated it to St. Thomas à Becket, who had been baptised at St. Mary Colechurch, and was one of the then very latest additions to the calendar of Saints. His tragic death had taken place only in 1170, and his memory was fresh. We may be reminded that to-morrow, July 7th, is the date of the Feast of the Translation of St. Thomas, the great day of the Bridge Chapel. The upper chapel, probably an addition of the fourteenth century, was 40 ft. high, the lower 20 ft., the latter certainly vaulted. Peter was himself the first official Warden of the Bridge, appropriately enough, the wardenship becoming afterwards an important City office.

The history of the Bridge House Trust is outside our scope, although closely associated with that of the bridge itself. It had its headquarters in Tooley-street. The first record of bridge property is in 1122, when it was in clerical hands. It seems to have been a prosperous and well-managed undertaking from the outset, and sometimes had to pay for its prosperity when Royalty was short of cash. We read that Henry III. for instance, laid a heavy hand upon it in 1249, no doubt to gratify his ambitious architectural interests elsewhere.

*A paper by Mr. W. D. Caröe, M.A., F.R.I.B.A., read to the London Society on July 6th.

In 1280, the structure of the bridge being ruinous, Edward I granted a patent to raise tolls for its repair. Five arches were just then swept away by an ice floe.

From a document of Henry III we learn that already there were dwellings upon the bridge. To erect such was one of those obvious and straightforward expedients peculiar to the mediævalists. The City was enclosed by walls and wanted to expand. There were the vacant starlings of the bridge. Why not use them? All difficulties of sanitation, which were peculiarly harassing in growing mediæval towns, were solved. Paris did likewise. The five bridges from the Ile were packed with wooden structures "clinging like martin boxes to the bridges so as almost to hide the water; damp, decayed, half sinister, the back windows convenient enough to drop a corpse into the black water below."

In 1320 an edict of vast import was enacted, which may come home to us in these days of prohibition. The sale of beer upon London Bridge was prohibited! Were the parapets of the drawbridge not high enough, we ask? In 1426 Traitors Tower at the north end of the drawbridge was erected, the passage of which was always dangerous, and many accidents occurred, despite the prohibition of 1320. In 1436–7 the south gate and two arches just within the drawbridge fell into the river. In 1504 six houses were burnt at the north end, and in 1577 the north tower was removed to make way for a great Frame building prominent upon the old views and subsequently the south tower was called Traitors Gate.

We must not omit to mention entries in the accounts for statues added to the bridge, showing the intimate association of sculpture with architecture in those days. SS. Peter, Paul, Michael and George had their places "in howsinges," *i.e.*, in niches, also St. Thomas à Becket and St. Catherine, the last in honour of Henry VIII's first queen. In 1578 Nonsuch House was erected between the seventh and eighth arches, from the north end, and gave its name to Nonsuch Lock. It was made in Holland and put together with oak pins, no iron being used. It also forms a prominent object in the old views and projected well out on to the starlings. The going way of the bridge being only 15 ft. it follows that the pier projections and starlings were freely used to carry the houses. Nonsuch House must, of course, not be confused with Henry VIII's fairy palace of the same name.

In 1548–9, January 22, comes the ominous entry, 'That Mr. Wylford and Mr. Judde, surveyours of the works of the brydge, shall to-morowe begyn to cause the chapell upon the same brydge to be defaced and to be translated into a dwellyng house, with as moche spede as they convenyentlye maye."

In 1582 the first Water Works were erected at the north end by Peter Moris, a Dutchman, the water power at the south end being employed shortly after to turn three corn mills.

In 1632 a great fire devastated part of the city and consumed forty houses on the bridge, but the fire did not reach to the centre, whereby we learn how closely the houses were packed together. In 1645–56 the houses were replaced and the roadway widened. Stow is eloquent as to the beauty of this work, with its platforms and prospects up and down the river, and even pretty little gardens and arbours, but it had but a short life, for only twenty years after—in 1666—came the greatest of all London fires, by which the north end of the bridge was again swept away and damage done to the masonry to the tune of about £25,000 of our money. In 1671 a new range of houses, four stories high, was erected, and the houses at the south end were demolished to continue the uniformity across. The roadway was now widened to 20 ft., and here we bid farewell to Nonsuch, 93 years old, but the chapel, though now used only as a dwelling, and later degraded into a store, and Traitors Gate, still bravely held on. In 1725 fire destroyed the latter, and with the gate there died the barbarous custom of exposing the traitors' heads to the public gaze. In 1728 a stone gateway was erected. In 1754 the engineer first comes upon the scene, but can hardly be said to have equipped himself with glory, for to him is really due the demise of this historical monument. Labelye, the Swiss engineer of the new Westminster Bridge just completed, and Dance, the City architect, reported that the houses should be removed and a wooden widening be erected on the western starlings, that the centre pier and two arches be removed and one great arch thrown across the intervening space. The bridge was, however, widened in stone on both sides instead, and reopened in 1759, over £100,000 having been spent upon it. The removal of the central pier released naturally the waters, and created such a scour that the adjoining piers were soon in jeopardy.

Smeaton, then at the height of his fame, was called in, and the stones of the city gates, then under demolition, were thrown in upon the starlings. It was the beginning of the end. The old fabric which had stood so firmly for eight centuries, could not withstand these new conditions. The accelerated stream kept washing away the foundations, the annual upkeep of which is said to have cost the Bridge Trust some £20,000 a year of our money. The danger of shooting the rapids was a constant source of complaint on the part of wharfingers and lightermen, for with the opening out of the centre the locks were no longer in use. In 1822, as a first step, the water works were removed, and projects set on foot for the abandonment of the ancient fabric which had served the City so well

Edward Cooke—some of whose delightful drawings of the bridges, old and new, I will show you—in glorifying Rennie's new structure, completed in 1833, writes this undeserved epitaph over the dying Procris—"The manner in which the bridge was constructed reflects little credit upon its architect," a slander which he unconsciously qualifies a few paragraphs further on, thus—"The old bridge had existed notwithstanding its many defects for 800 years." Not only had it withstood fire and water, ice and tempest, not only had it been the safe passage way of millions of citizens from the highest to the lowest in the land; but it had been the actual home of generation after generation. Of the many dwellers upon it, perhaps Hans Holbein was one of the most distinguished. It is well to recall the joy and pride of the citizens in their bridge by recording the ancient custom of decorating its gates with leafy boughs and garlands on midsummer day. We may fitly write its epitaph in these kindly words: "May the new bridge stand as long."

In 1900, the need for widening the bridge had become urgent, the congestion beyond reason. Here, indeed, was an opportunity for courage. King William-street had the makings of an approach to the City without rival, such as the city of the empire deserved and does not possess. But the war had not then come to teach us courage in finance. If the City had seized its golden opportunity (golden in more ways than one) the monumental reconstruction of King William-street and London Bridge would have repaid the city in usurer's interest. The south side of King William-street might have been set back so as better to free St. Magnus Church and the Monument, opening out these features from Gracechurch and King William-streets.

The bridge might have been widened eastward to double its width or more, and thus Rennie's great design need never have been mauled. But our city fathers lacked courage or initiative. The scheme was adopted of throwing out cantilevers from the side of the bridge to carry the footwalks, and a pierced parapet substituted for Rennie's simple and solid one, a weak scheme showing a good deal of science, but no art. The traffic was inadequately relieved, while Rennie's conception was seriously degraded. The simplicity and balance of parts, upon which it primarily depended, were sacrificed. King William-street has since been partially reconstructed in the piecemeal fashion dear to the heart of the Britisher. It remains, and I suppose will continue, a second-rate thoroughfare, whose values (from the economic standpoint) do not, and are not likely materially to increase, just because, despite its occupying one of the finest sites in London, there is nothing in it, save the Hall of the Fishmongers' Company, to make it other than second class. How easy to have made it first class!

Cannon-street Railway Bridge (1863–66, SIR J. HAWKSHAW).

Until we come to Chelsea, the South-Eastern and Chatham Railway Company absorbs all the railway bridges spanning the river, and even half of the Grosvenor Bridge. It cannot be said that the railways have been kind to London, or worthy of their great importance in modern life. Nevertheless, Cannon-street railway bridge holds first place, and in certain aspects approaches that phase of the majestic we are apt to associate with the ungainliness of the mastodon. So far as architectural forms are applicable at all to cast iron, we must accord its designer some measure of success. We don't want it, but we might have much worse. We might have another Charing Cross, for instance, which was by the same hand. We feel how gladly we would follow the guidance of the Pennsylvania railroad in New York and put the railway underground, and bury Cannon-street Station with it. This is a quite serious suggestion. What New York has done on a mighty scale in rock, London can do on a comparatively small one in clay.

Southwark Bridge, 1814–19 (JOHN RENNIE).

Southwark Bridge was the second to which cast-iron was applied in London. Its utility was never fully developed, and as its life was comparatively short, let us just say of it that though its merit was perhaps mediocrity, its lines were generally pleasing. This was a true arcuated construction, iron voussoirs, set together by bolts in place of mortar, being employed. Its distinction lay in the bold sweep of its three great arches. Its continuance seems to have been in jeopardy and its gradient was against it. So much was this the case that it was deemed fitting to re-erect it, even without the widening of its approaches. Sir Ernest George, R.A., has been wisely called in to ensure our having something better. He kindly allows me to show you what we are to look forward to possessing. He is responsible only for the masonry and the parapet, and we can but regret that he was not given an opportunity of showing us by a complete stone construction the outcome of that delightful series of studies expressed in water colour which he has made of most of the best bridges of Europe. Sir Ernest's design, through no fault of his, to my mind, suffers somewhat by the lack of shore abutments projecting from the quay-side—almost an essential for monumental bridge construction.

It may be useful here to make an interpolation The bridges erected before old London Bridge was finally demolished were, in order of date:—Westminster, Blackfriars, Vauxhall, Waterloo Southwark. The foundations of all more or less gave way, but do not let us thereby blame, their designers. The starlings of London Bridge occupied so much of the waterway that their removal altered the Thames between London Bridge and Teddington from being almost an inland lake to the stream as we know it. The designers of these bridges catered for the former condition, and not the latter, and the failure of their work was no fault of theirs.

St. Paul's Bridge.

Of St. Paul's projected Bridge I shall not say much. I have never been seriously convinced of the need for it. If needed, I think St. Paul's should have formed the focus of the scheme rather than the cat's-paw of its opponents. There are those who assert that a lack of architectural grasp on a large scale is inherent in the race. Is it possible that the development of this great scheme on its determined lines gives substance to the contention? I feel convinced of this: that the practical needs of the traffic, by way of averting congestion, and the architectural needs of St. Paul's, and the occasion, do really happen to coincide in this case. I am not equally convinced that this

happy fact has been fully grasped by those in charge of the scheme.

St. Paul's Railway Bridge, 1883–6. MESSRS. MILLS, WOLFE BARRY & BURNET.

Blackfriars Railway Bridge, 1863–4. JOSEPH CUBITT.

Two railway bridges nestling like love birds, or perhaps shirking criticism, come next:—St. Paul's Bridge is an iron-arched construction on stone piers, but so blanketed by its neighbour that its existence is hardly realised by many. That neighbour, Blackfriars Railway Bridge, erected as well as designed by Joseph Cubitt, tries to be architectural with its clustered columns and scrolled shieldpieces. I condemn it root and branch, by the very fact of its inherent selfish blanketing. It possesses an almost calculated intrusiveness, denying the enjoyment we ought to be allowed of other structures and prospects, on and off the river.

Blackfriars Road Bridge (Old), 1760–69. ROBERT MYLNE.

The first bridge of Blackfriars was projected in 1756 by Act of Parliament, and was the first work of the Bridge House Estates outside London Bridge. A competition was instituted, and out of twenty designs sent in that of a young Scot, Robert Mylne, fresh from study in Rome and the Grand Tour, was selected. Despite all that the great Dr. Johnson could do to crab it by way of favouring his friend and protégé, Gwynne, it was erected and opened in 1769. The elliptical arch was declared by Johnson and the critics to be as unsightly as it was inherently weak; collapse sooner rather than later was prophesied—all to no purpose. We can only regret that when under-traffic demanded more waterway and over-traffic an easier gradient, the monumental instinct which Mylne had fed, fostered and expressed had expired. The bridge had cost £153,000 in 1760–69. In 1833—a significant date in relation to the removal of Old London Bridge—owing to the ravages of the water upon the Portland stone employed, £103,000 had to be expended. At the same time the crown of the road was lowered and the approaches raised, the gradient being reduced from 1 in 16 to 1 in 24. Mylne became surveyor of St. Paul's and his work there commands our respect. We may recall that he built for himself an interesting mansion just between his bridge and the great Cathedral, on a spot where now stands the vulgar and detestable St. Paul's Railway Station.

Blackfriars New Bridge, 1864–69 (JOSEPH CUBITT).

What wayfarer across our present Blackfriars Bridge who has any pride in his environment is not depressed by the circumscription of his view seawards? It is one of the peculiarities of bridge construction that in few instances does the structure make any appeal to those who pass over it, unless a flanking view has been first obtained. As regards Blackfriars, the flanking view is possible only to those who approach it from the west on the Middlesex shore. The appeal in this case, from whatever aspect made, is not a strong one, although strongly made by an excess of applied architecture and meaningless ornament. This is insidious work. We have four granite shafted "Gothic" fonts to serve for piers. They are hopelessly without scale and carry nothing but a loiterer or two, and are joined up by some iron segmental arches, said to be excellently constructed. I am glad to accord them such merit as they possess. The designer seems to have been ashamed of his good construction, for he masks it with a cast-iron petticoat, ornamented and balustraded after the manner of the manufacturer's catalogue. This characteristic Victorian effort at monumental prettiness cost £475,000. We must console ourselves by contemplating the work of an age surer in its conception of monumental fitness.

Waterloo Bridge, 1811-1817 (JOHN RENNIE).

In Mylne's days the orders held sway. His Ionic order at Blackfriars no doubt led to the Doric at Waterloo, the masterpiece of our bridges, opened in 1817 and fitly called after the great battle. Constable has left a remarkable painting of the great event vivid with colour. "Good wine needs no bush," and I refuse to admit the criticism that its "order" is an extraneous addendum. It just adds the monumental note and brings all the parts into harmonious scale.

The bridge had suffered at one time from the attentions of the gas engineer. Some nondescript "reach-me-down" lamps and lamp-posts had supplanted the admirable originals. The R.I.B.A., aided by Sir George Frampton, succeeded in setting right that lapse of taste. I well remember how, many years ago, I was rebuked by one of the protagonist pundits of the L.C.C. for "exaggerating the importance of such a detail."

It is said that the scour of Thames unbridled is undermining the security of this admirable structure, and that its condition is precarious. I have faith in the pride and skill of our engineers, that they will see to it that so fine a monument is never in jeopardy.

Charing Cross Railway Bridge, 1860–4 (SIR J. HAWKSHAW).

And now we come to Behemoth itself. I show you Brunel's Hungerford Bridge, its predecessor, the brick piers of which up to the railway platform are still doing service in the Thames, while the chains are spanning the Avon at Bristol, where Brunel had won a competition in 1829 for a chain bridge he was never to see erected, owing, be it regretfully said, to the jealousy of Telford. Those who want to know anything about Behemoth will find all details set down in a reprint from the proceedings of the Royal Institute of Civil Engineers by Harrison Hayter, to which I must refer you. Apart from the intrinsic ungainliness of the erection, I quarrel with it because, owing to its so prominent position on the River bend, its ungainliness obtrudes on all sides. It exasperates. It obstructs the prospect of Waterloo Bridge and Somerset House from Westminster, and the prospect of Westminster from Waterloo Bridge. Whichever the way of approach, focussing that best of all our river sweeps, far-famed by Wordsworth, there it blocks the outlook. Into the recent controversy there is no need for me to enter. It is fresh in your minds. *The Times* on June 14 last published an admirable leader, quite unanswerable to my mind. Lord Curzon told us in the House of Lords that Charing Cross was probably the most inconvenient and ill-equipped railway station in the world, and he was right. He asked if all the grand surroundings were to be defiled by the continued existence of the monster. Again I say, he asked rightly. Despite it all, Parliament has once again shown itself deplorably behind the times and behind the people. The arguments used in both Houses to support the railway company's Bill were really deplorable from the point of view of those to whom the nobility of London has some meaning. And that being the case, I am optimist enough still to trust sufficiently to the good sense of our people to believe that in five or six years' time the knell of the Monster will be sounded, and a great road bridge projected to take its place. But I am conscious that use and custom are such that it is much easier to withhold than to withdraw. If suburban Kent had never had the facilities of Charing Cross, suburban Kent would never have missed them, but, having tasted of the apple, the knowledge is there. Kent claims what Surrey has never asked for, and the greatest opposition must be expected from men of Kent and Kentish men, who should be appeased; and can be by even greater facilities than they have, and which Surrey can share. Why not, then, seize the chance for through railway connection from South Western as well as South Eastern to all the northern stations, from Paddington to King's Cross. I am thus the strongest advocate of an underground station at Charing Cross, which will deal with South Western as well as South Eastern suburban traffic without change. It is Pennsylvania of New York once more; once more what New York has done in much more difficult circumstances, we also can do.

Such a new Charing Cross station would be much more satisfactory than the present, for it would be in immediate contact with the Metropolitan, the District, Bakerloo, Hampstead and Highgate railways, as well as with the Embankment trams and the Strand omnibuses, and it would form no block to the traffic. We must not forget that the present railway systems of London were laid out for the most part when railway science was in its infancy, when the application of electric power and the driving of tubes through the clay were yet unknown. The intercommunication railway problem of London is thus ripe for solution, and until that solution is determined and agreed upon—not necessarily the railways constructed—our much-desired Charing Cross improvement may have to wait. I want to see a strong Railway Committee appointed at once to deal with this pressing railway problem.

Taking then a new road bridge as a necessity of the future, which no Londoner worthy the name will be content to do without, here is my scheme for it. I am a low-leveller of firmest conviction, always with the proviso that the low-level permits a stone bridge to be erected. Only, if it be proved that that cannot be done, will my prejudice be allayed. But I know it can be done. The levels are difficult—admittedly. But I have worked them out carefully, and the difficulties can be surmounted. They are awkward chiefly, but far from insurmountable, in connection with the eastern entrance of the National Liberal Club, and some of the shops and entrances in the block of buildings opposite, containing the Royal Colonial Institute. The general treatment of the Charing Cross approaches does not admit of great variety, and I find myself in pretty close agreement with Messrs. Niven and Davison's able and stately plan, to whom I will only say that I had made my plan before I saw theirs. My bridge is on the true axis of Northumberland-avenue, like theirs. I demur altogether to the criticism that the Embankment would look "humped" by a rise and fall of the river wall at this point. The long level line, which is extremely valuable, can quite well be maintained as an outer walk with an inner wall stepped up behind it. Such stepping is quite satisfactory and harmonious, and would in this situation be aided by the curve of the river sweep. A feature of my plan is to send the trams under the bridge, which is easy enough. A tram station in connection with the Undergrounds at this point would be a great boon, and the cross tram traffic difficulty defeated. On the Surrey side I place the two stations symmetrically on Waterloo-road as an axis running between them under a high level glazed station-approach. One station is called "Waterloo." Let us call the other "Ypres," or "Wipers!" The practical advantage of symmetrical stations is obvious: people who know their way about one will not be at sea at the other.

The artistic *dis*advantage of a prominent glazed area between the stations is equally obvious. This I surmount by the mask of a great colonnade, devised so that St. John's church and churchyard can form part of the group, if desired, or the church can be moved to divide the traffic at the bridge approach, in which case I would somewhat remodel its tower and re-erect it in Portland stone. It would be still in its parish. In the vacant space opposite St. John's I place a garden, possibly with a tea-house or restaurant under the colonnade. At either end of the station approach I suggest rival railway companies' hotels, perhaps with a colonnaded covered way linking them together, if they are wise enough to be friendly. The rear approaches to "Wipers" all work well. I have amended the lack of taxi-stand space at Waterloo. Waterloo Bridge is degraded by the mean stairways at its southern end. Their filthy state is a crying disgrace. These should be opened out and inclines secured to shorten the approaches to the bridge.

The Surrey side is laid out by groups of monumental buildings and well-treated ware-

houses, with basins or docks approached under the proposed embankment. Direct approach to these from the railways is secured by a roadway opening out the stations and their colonnade as seen from the Temple Gardens, and *vice versa*, of course. I will only add that with a high level bridge a similar scheme of stations is possible, but it does not work out quite so well. It would be essential to descend from the bridge to—let us call it "Anzac" Place, and ascend again to the stations. A high level bridge thus repeats the Waterloo defect of descent at the Surrey approach—one of my objections to it. A second is, that Waterloo Bridge, being high level, this ought in its turn, to be at low level, so as to secure a direct embankment approach, somewhere between Westminster and Blackfriars. It involves an awkward cross traffic crossing at the Strand end, a point which has been overlooked in some of the schemes. But most of all, artistically, it involves a lofty bridge, which, however commanding in itself, means once more interrupting those very prospects I want to see freed.

As a dweller in Surrey, I have often found the need of some shelter in making the river crossing on foot. In the R.I.B.A. design for Vauxhall Bridge such shelters were suggested at the piers, and I suggest the same in the design for the new bridge. And why not carry the idea a step further and cover the foot walks of the central span, and thus make the bridge interesting from within as well as from without? A memorial bridge ought to tell something of its meaning to those who pass over as well as under or view it from the side. Such a feature, well designed, would give interest to a memorial and monumental structure, and scope for architectural expression, particularly called for in a memorial connection. The battle honours of the London Regiments, for instance! Why not St. George facing Joan of Arc in the centre? and at the shore abutments appropriate groups, or perhaps equestrian statues—Lord Roberts and Kitchener? and it would not be difficult to find others.

The central arch is precisely the same width as that of London Bridge. At spring tides the total waterway is considerably greater than either new Southwark or London Bridge. A central arch so treated would break, not block, the prospect of objects beyond the bridge, and such breaks are a gain and not a loss to the vista.

Westminster Bridge:

Old, 1741–1750 (LABELYE);
New, 1854–62 (THOMAS PAGE).

In 1735, commissioners were appointed by Parliament to erect a bridge at Westminster of any material they thought proper. The design of James King, a carpenter, was accepted, who, poor man! called in Labelye, a Swiss engineer, to erect the stone piers for his timber construction. An agitation, headed by Maitland, the historian, was got up in favour of a stone bridge, in which Labelye himself gaily joined. It succeeded, and so did he! And it ended in Labelye adapting his stone piers, built for King, to a stone bridge designed by Labelye, for which James King pathetically prepared the timber centering. Labelye proportioned the size of his piers to the span of the arches by the formula $\frac{1}{7}$-1, s being the span. He invented a form of caisson for the erection of his piers, subsequently used for those at old Vauxhall, but I have no time to describe it. The bridge was opened in 1750, having cost £225,000, equivalent to some £700,000 to-day The gradient, the heights of the parapets, and the obstruction of waterway were frequently matters of complaint. In 1840 the bridge was widened, a fortunately abortive scheme having been abandoned for Gothicising it to harmonise with the then new Palace of Westminster. In 1852 it gave way to the present bridge, by Thomas Page, completed in 1862 and costing some £375,000. If careful and elaborated drawings could spell success, this bridge should have no rival. It was Page's third essay. The first two designs, one of three arches, the other of five, endeavoured to emulate in cast-iron Barry's Palace. The present is a weak-looking and unsatisfactory structure. Its construction is curiously composite. Up to low water level it consists only of wooden piles, which have a cast-iron shield plate to protect them, and a bed of concrete over them. They can be seen at neap tides. Then granite piers rise to springing level. The granite pilasters above form a mere shield again, while the cast-iron petticoats, in themselves a useless encumbrance which do not carry the true line of the bridge, cloak some well designed metal arches which had been much better exposed.

Lambeth Bridge, 1862 (P. W. BARLOW).

Cost £49,000, and is now rapidly disappearing. I would plead for a graceful and simple chain bridge here, without fuss or furbelows. But considering its surroundings, whatever be done here, should be of the best.

Vauxhall Bridge:

Old, 1812–1816 (SIR S. BENTHAM AND S. WALKER).

New, 1899–1906 (SIR M. FITZMAURICE, W. L. COPPERTHWAITE AND W. E. RILEY).

Is a makeshift, but a clever and creditable one at that. The piers were erected for a concrete bridge, which was abandoned only after the piers were partially built, for what we see, because the waterways required by the Act could not be maintained during construction. Thus the permanent structure had to be entirely remodelled to suit purely temporary requirements. Rennie designed a stone bridge of seven arches in 1809 on London Bridge lines, but not so good. It had a considerable gradient, and the "cooking" in Rennie's drawing to work in the raking joints of the spandrels with the horizontal ones of the piers is an interesting study. Although the first stone was even laid in 1811, the scheme was unfortunately abandoned. Sir S. Bentham then designed a bridge with cast-iron arches, which was carried out with slight alteration by James Walker. I mention these facts because Rennie has been frequently credited with an inferior design with which he had no association. The chief merit, if not the only one, in design possessed by the old bridge was its deft parapet.

I put on the screen, in order, the successive stages of the development of New Vauxhall Bridge.

First, the original design, a weak *rechauffé* of Blackfriars, Sir A. Binnie being engineer, which was abandoned largely in consequence of the R.I.B.A. protest.

Successive further trials. The R.I.B.A. design limited by the L.C.C. to granite and steel. Then Mr. Norman Shaw made a design for a camber beam bridge, which is not available. Then the concrete faced with granite design followed, a somewhat pretentious affair, the displayed arch stones obviously a mere dressing, too weak for their pretended work.

Finally, the steel arched structure upon the piers built for the concrete. It is most unfortunate that this graceful and workmanlike structure cannot be better seen. That we all like the spindles of the parapet I am not sure. They have the merit of freshness, but it would be difficult to better the rest of the steelwork. The sculpture was executed in bronze by Mr. Pomeroy on the south side, by Mr. Drury on the north. We can only heartily congratulate the L.C.C. for initiating the roping in of the arts. But there were penny steamers when that work was done. Yet, after all this skill and science and admission of the Arts, we are amazed that our councillors should, in place of the pylons originally devised for the Westminster abutment, permit a firm of advertising millers to pile on their agony almost on top of the bridge itself. It is an outrage on public decency.

I must hasten over what remains.

Grosvenor Railway Bridge, 1860 (SIR J. FOWLER AND SIR C. FOX.)

A structure quite without interest, except perhaps that it is painted different colours on its two sides.

Chelsea Bridge, 1858 (T. PAGE).

Laden with trumpery detail. Several thousands had to be spent upon strengthening it just after it was opened. The last painting before the war cost over £1,400.

Albert Bridge, 1873 (BY R. ORDISH).

The first Atlantic cable was used in this curiously composite structure, the mathematics of which Mr. Copperthwaite tells me defy calculation. In 1884 the cable gave place to steel bars. Stripped of its gewgaws this structure has undoubted interest and the sweep of its bridge line is really imposing. But it is unequal to the needs of modern traffic.

Old Battersea Bridge

Was erected by fifteen adventurers in 1771, at a cost of £20,000, and it lasted until 1886, having been meanwhile widened in iron and had two of its piers removed to help the waterway.

Battersea Bridge, 1890 (BY SIR J. BAZALGETTE).

The last bridge legacy of the M.B.W., and an artistic and practical failure—artistic because classical piers after the pattern of London Bridge, nondescript arches, with cast catalogue spandrels, and a Moorish parapet cannot live in artistic harmony together; a practical failure because of the great coves between the true bridge construction and the petticoats, necessarily deceiving the bargee as to his head room, and suffering occasional knocks in consequence.

Putney Bridge, 1883–6 (SIR J. BAZALGETTE).

I include this, although above Battersea, as a fine, simple structure itself, on Rennie's lines, but because it records for us Rennie's original London Bridge parapet, now lost to us. Of other bridges between Putney and Battersea perhaps the less said the better.

A few words in conclusion. The river traffic on the Thames is a dwindling quantity to all appearance, although I have not fortified this statement by statistics. Yet the Thames Conservancy have laid down some arbitrary rules, wholly ignoring—indeed, in practice, denying—the claims of London to be an Empire city worthy of noble monuments. The power of the Conservancy has passed to the Port Authority. Can it not be made clear to them that while they allow Mr. Cooper to house them architecturally in due relation to their importance, we claim for the Thames also some architectural and monumental consideration?

And now the conclusion of the whole matter. Behemoth must go and we must have a worthy stone bridge in its place. How is that best to be accomplished with the proceedings of Parliament fresh in our minds, at a time when Parliament is—when we are all—so busy with the arts of war? How can we best secure and preserve our amenities? I have remarked and would like to insist that every bridge—each, with many shades between, a monument of nobility or of shame—ought to be part of a co-ordinated or ordered scheme; part, indeed, of that development plan of London towards the accomplishment of which the London Society has set itself. And development means for bridges what it means for streets and places, the laying out for dignity as well as for convenience of traffic. But it means more—it includes the dignity of structural design. Obviously co-ordinated development cannot exist amid unco-ordinated authority. I want, then, to see a Bridges Board for London so constituted, by Act of Parliament if necessary, that it shall do for all the bridges and their approaches, including railway bridges, what the Bridge House Trust has hitherto done for the road bridges of the City. Such a Board must be above the trammels hitherto unreasonably imposed upon the part of the Thames Conservancy.

The City Corporation, the L.C.C., the Road Board, the Port Authority, would each have their proper representation. Nor would there be lacking representatives whose special function would be to watch over the dignity of Thames-side, and save us from possible repetitions, reconstructions or amendments of railway bridges, imposed upon us by individual Acts of Parliament, and erected regardless of those amenities which a self-respecting city ought to have, as in the forefront of its aspirations, the right to command, to control, and to protect.

Do not let us deceive ourselves or be too complacent over what we possess. There is a simple and certainly none too lofty a standard for us. Is each bridge across the Thames of such a character as to be classed among those world examples the educated and intelligent sightseer desires to go out of his way to see? Is each one such as those among us who have a proper civic pride would wish him to go out of his way to see, or indeed to see at all?

Of Rennie's Waterloo Bridge, fortunately still intact (long may it remain so!) yes, a thousand times. Of Rennie's London Bridge, yes, without doubt, in its former simpler dignity.

If Vauxhall Bridge rises to that level, I am afraid no sightseer can at present be gratified. We hope that new Southwark Bridge has a future of dignity before it.

But of the rest! Shall we not rather hide our diminished heads and think of such renowned examples of power, or dignity, or grace as the Pons Aelius and Pons Milvius at Rome; the Pont de Gard; the delightful Roman bridge at S. Chamas, with its triumphal arches; the Pont d'Avignon; the Pont de Cahors; the Ticino Bridge, at Pavia, with its covered arcades; the Verona Bridge; Ammanati's Ponte della Trinita, at Florence, 1566; Antonio da Ponte's Rialto, 1588; the Alcantara Bridge; the Toledo Bridge, at Madrid; the Kurfürsten and Schloss Bridges, Berlin; Jena Bridge, Austerlitz Railway Bridge, the Alexander III Bridge at Paris; and do not let us forget the Escuter Bridge, Buda Pesth, by an Englishman; the grand Auld Brig at Stirling, and Telford's Menai Bridge.

I will not weary you with a longer list. I do not suggest that a single example should or would be suitable for London, or even a model to form something suitable upon, except perhaps the Escuter Bridge, for such a position as Lambeth. But I select examples of bridges—definitely and effectively considered—each adapted to its own sphere, as a noble architectural monument.

When our authorities have grasped the fact that each London bridge erected is worthy of being considered as a noble architectural monument as well as an example of engineering skill, the task of the London Society, as regards London bridges, will have been accomplished.

The Housing Question, Birmingham.

At a meeting of the Housing and Town Planning Committee of the Birmingham City Council, the question of the shortage of houses in the city was considered. This shortage is estimated at from 10,000 to 20,000, and, in addition, the special Housing Enquiry Committee reported in October, 1914, that at least 50,000 houses in the old parts of the town would have to be replaced. At the close of the meeting the Chairman (Councillor G. Cadbury, jun.) stated there was a very big building programme in front of the Corporation. The committee felt that it would be necessary to build at least 5,000 houses a year immediately after the war, and as each house would cost about £250 with land and roads, an annual expenditure of one-and-a-quarter millions would be necessary. If prices kept at their present high level, it might be even more. It was further reported that the committee had given careful attention to the question of the shortage of houses in East Birmingham. The great difficulty at the present time was not only the provisions of funds, but the difficulty of obtaining materials and the high cost of building. The Government in certain munition areas had given grants towards the cost of houses up to about 25 per cent., but even then with the present high rate of interest it would be impossible to build houses to let at anything like the old rents. The question of other materials than brick had also been considered, but it had been found at the present time that timber was even more expensive than brick, and the results of experiments where it had been tried did not encourage the committee to advocate the use of that material. It was also stated the committee were pressing on with the various town-planning schemes with a view to presenting a report to the Council at an early date.

OBITUARY.

Mr. Chatfeild Clarke.

We regret to announce the death, on July 12, at 66, Inverness-terrace, Bayswater, of Mr. Howard Chatfeild Clarke, in his fifty-seventh year, of 102, Bishopsgate, architect and surveyor. He was the eldest son and partner of Mr. Thomas Chatfeild Clarke, F.R.I.B.A., F.S.I., who died in 1895, and whom he succeeded as surveyor to the Fishmongers' and the Cordwainers' Companies. He was surveyor to the Provident Clerks' and General Mutual Life Assurance Association, the Scottish Union and National Insurance Company (in London), and other insurance companies. He was land surveyor to the London, Tilbury, and Southend Railway (since 1901), and to the Midland Railway since that company absorbed the Southend system. He died from heart failure, succeeding pneumonia, induced by strain and overwork; he had lately been engaged in making surveys and valuations in many parts of the kingdom at the request of the Ministry of Munitions as their honorary adviser. His services were in great demand as an expert witness and arbitrator in compensation cases under the Lands Clauses Consolidation Act and similar measures, as well as in party-wall and light-and-air disputes in the High Court of Justice, on behalf of both public authorities, including the London County Council, and property owners. Amongst the cases in which he was concerned as arbitrator were claims for compensation by the Commercial Union Assurance Company in respect of the pulling down of their premises, 55, Charing Cross, in order to open out the entrance into the Mall Processional road; of a widening in Little Britain, E.C.; the enforced removal of "Short's" from Aldwych; and for Cohen's Trustees as to the extension of H.M.'s Patent Office site in Furnival-street, E.C. Mr. Clarke was elected a Fellow of the Royal Institute of British Architects on January 8, 1906, and served as member of the Practice Standing Committee, 1910–12; he became a member of the Architectural Association in 1905, and contributed liberally to their New Premises Fund and Library; he was President (1914–15), Vice-President and Member of Council Surveyors' Institution; Member of Council, Architects' Benevolent Society, and a generous contributor to their funds; and Vice-President, Builders' Clerks' Benevolent Institution. He was appointed by the Surveyors' Institution to serve upon the joint committee of the R.I.B.A. and the Surveyors' Institution to obtain an alteration in the law affecting "ancient lights," and to draft a Bill.

On January 1, 1913, Mr. Clarke took into partnership his eldest son, Mr. H. Cyril Chatfeild Clarke (who had joined the Architectural Association in 1906) under the old style of T. Chatfeild Clarke & Son. He was associated with his father as architect of the Bishopsgate School for Girls, with house and chapel, Spital-square, and the Cooper-street Schools, for the Governors of the Central Foundation Schools of London; Royal Bank of Scotland, Bishopsgate; *Daily News* offices, Bouverie-street, E.C.; buildings for the Mercers' Company's School, Barnard's-inn, Holborn (1893); Essex-street, Strand, Unitarian Hall, and the Essex Unitarian Chapel, the Mall, Kensington, with the organ-case; rebuilding on south side Oxford-street, between Park and North Audley-streets (November 15, 1884*), 385–7–9, 391–7 and 461–3, Oxford-street, on the Duke of Westminster's estate (December 10, 1887, and October 27, 1888*); 79 and 79A, Watling-street, E.C.; University Hall, Gordon-square, W.C. (by T. Lever Donaldson), alterations for purposes of Williams' Library; on December 8, 1888, we published their designs (second premium), Battersea Public Library.

He was the architect of Maida Vale and Kilburn Unitarian Hall and Church, in a limited competition (May 23, 1896*); Coopers' Company's School for Boys, Science and Manual Training Side, in a limited competition; Mission buildings, Bell-street, Edgware-road, N.W.; St. James's Church, Gunnersbury, enlargement, &c.; 29, Wood-street, E.C., and 1 and 10 and 11, Aldermanbury, E.C.; offices on the site of 15, Devonshire-square, E.C.; Campsbourne and Crouch End Board Schools, Hornsey School Board; Handcross Park, Sussex, for the late Mr. John Warren; Indemnity House, 1, Old Broad-street, E.C.; the Hollis almshouses, Whirlow Bridge, Sheffield, with central administrative block; rebuilding, between 2–12, Brompton-road, S.W.; Dr. James Martineau Memorial Buildings, with lecture-hall, class-rooms, &c., Colegate-street, Norwich; designs for United Services Co-operative Hotel, South Kensington, upon a site opposite to the Oratory; 69–71, South Audley-street, W.; alterations, &c., Caledonian Insurance Company's Offices, King William-street, E.C.; decoration, carried out by Mr. G. D. Crace, at Fishmongers' Hall, and, for the Company, three warehouses in Fishmongers' Hall-street; warehouses and offices, Fountain-court, Aldermanbury; 87 and 88, Gracechurch-street; Bow and Stepney Foundation Boys' School, Tredegar-square, Bow, Science side and new wing (in limited competition); Gresham's School, with head-master's house, Holt (January 25, 1902*); Congregational Hall, as part of Unitarian Church, Quex-road, Kilburn; for the Cordwainers' Company, interior decoration of their premises in Cannon-street, in the Adam style, 1901–2, and rebuilding of Hall with suites of offices (July 2, 1910*); City and Guilds Technical College, Finsbury, new wing for art department and engineering side (1907); buildings and offices on Princes-street and Matthew Parker-street site, Westminster; 39, St. Mary Axe and 13, St. Helen's-place, for Leathersellers' Company; 55 and 56, Threadneedle-street (November 6, 1911*); New Whitehall Club, Westminster; additional stories, 25–27 and 94–96, Bishopsgate; Cooper-street Schools and Institute, enlargement; designs for extensive additions, Mental Hospital, Croydon; 3 and 17 (May 23, 1913*), and other premises, St. Helen's-place, E.C.; enlargement on site of 8–12, Montagu-court, of the Bishopsgate School for Girls, Spital-square; alterations, Pantheon, Oxford-street, for Messrs. W. & A. Gilbey; factory, Tower-hill; 176, Tottenham Court-road; premises for Messrs. Rylands & Sons, in Milk-street, Cheapside; and, two years ago, restoration of the Unitarian Meeting House (of *temp.* Charles I) in Church-street, Deptford. He was the author of papers on "The Construction of Town Buildings," Surveyors' Institution, at Manchester (April 30, 1898†), and "Ancient Lights," (April 5, 1902†), and "The Bill for Altering the Law of Ancient Lights," Liverpool Architectural Society (November 28, 1903†).

Mr. Clarke was educated at Clifton College and was a member of the Reform Club, and President, Auctioneers' and Surveyors' Musical Society. In 1884 he married Gertrude Victoria, daughter of J. J. Galt, of Fernhill Park, Isle of Wight. He leaves three sons and three daughters; two of his sons are in the Army, and it is reported that one of them is missing and wounded.

Lieutenant R. W. Follit.

Reginald William Follit, Lieutenant Royal Flying Corps, reported "missing on April 28 last is now officially reported to have died of wounds, a prisoner in German hands." He appears to have brought his observer (now also a prisoner) safely down, but himself to have "died later." He was the younger son of Mr. William Follit, of Millbank Slate Wharf Westminster, and Avenue House, Clapham Park, S.W. On finishing his education at St. Lawrence College, Ramsgate, he entered his father's business and was greatly liked by all with whom he came in touch. Having early joined the H.A.C. he, at the outbreak of war, at once volunteered for service, obtained a commission in the R.F.A. and, while in France, transferred to the R.F.C., acting as observer. He returned to England, gained his pilot's certificate, and had been only ten days again at the Front when the aerial engagement took place. He was 26 years of age, and leaves a widow and infant son.

* Illustrated in the *Builder*.

† Reported in the *Builder*.

THE BUILDING TRADE.

SCIENCE APPLIED TO BUILDING.

In a recent article we made an appeal for the urgent claims of natural science in connection with education in all matters concerned with building, and pointed out that while for the rising generation a proper course of science taken in hand at school age was essential, the needs of those of mature years now actively engaged in constructional occupations should not be overlooked. It is useless to ask the average man so engaged to seriously study now for the first time abstract science and to subsequently employ this knowledge to his material advantage, because he has neither the time nor the enthusiasm to adopt this course, which is undoubtedly the correct one. But if by the unorthodox method of taking practical points which come up for solution in the trades, and showing how the principles of science can help in such solution, a general respect for pure science can be inculcated, not only may some who still retain a measure of youthful elasticity be induced to more serious study, but what is more important from a broad standpoint, the voice of public opinion may be strengthened to demand more complete facilities for this study for those who are to come after us.

In order to avoid too much generalisation, and in the hope of interesting specific workers, we propose to arrange these articles, even at the risk of a little repetition, under definite trades, and to endeavour to show how measurements of various kinds, the composition of materials, and the effects of the every-day changes which they are called upon to undergo can be understood by the help of elementary science.

THE PLUMBER & HOT WATER FITTER.

Run and Super Measurements.

Measurement is the very foundation of all science, for only by measurement can comparison be accurately made and general principles, which enable us to rely on certain things happening in certain circumstances, be ascertained. Now the commercial desirability of accuracy in measuring depends upon the relative value of the material in question and the time spent on the operation. Lead, copper and some other materials with which the plumber has to deal are expensive, and thus pay for greater accuracy than, say, timber. Every substance, indeed, may be said to possess a commercial accuracy limit of its own which in these days of close estimating should be regarded.

We are concerned in this article only with "run" (or length) and "super" (or area) measurements, and will deal first with the former.

Run Measurements.

Though feet and inches are, of course, used for "runs," all scientific work is based on the metric system, and though it may be long before this system is in trade employment generally here, if we want to do business abroad—*e.g.*, with France—a slight knowledge of this system is essential. Most metric tables contain an alarming amount of measures very seldom used in commerce. The metre is 3 ft. 3¼ ins. long, and is divided into 100 parts called centimetres, each of which is further divided into 10 parts, called millimetres. Familiarity with the system is best obtained by carrying a rule marked in both inches and centimetres.

1 in.	= 2½ centimetres	(accurately	2.54)
1 ft.	= 30½ "	("	30.48)
1 centimetre	= ⅜ in.	("	0.393)
1 metre	= 39½ ins.	("	39.37)

Run measurements can hardly be made with accuracy to less than ¼ in. with an ordinary rule, which, of course, is more than sufficiently near for many purposes, but when the thickness of sheet metals is concerned—also really a run measurement—some form of gauge is required. These gauges are not marked in fractions of an inch, but in numbers, they differ for sheet and wire, and more than one system exists—*e.g.*, the Birmingham gauge and the Standard gauge. This involves learning or consulting tables, and if metal workers would agree, like tyre makers, to universally adopt the millimetre (about $\frac{1}{25}$ in.) much trouble would be saved and uniformity with France would be secured. A run which is not a straight line may be measured by finding the length of string (cotton on a drawing) required to lie upon it. Some regular curved runs, such as circles, admit of measurement by simple calculation. The well-known rule that the circumference of any circle is 3½ (accurately 3.14) times its diameter is of constant application to such things as labour on welted edges and flashings to flats and domes, and is, of course, applicable to parts of circles, being half 3½ for a semicircular bay and a quarter of 3½ for a sector with its two radii at 90 deg.

Super Measurements.

Super or square measurements made in square feet or yards or "squares" of 100 sq. ft., may be connected with the metric system, which employs square centimetres and metres, as follows:—

1 sq. in. = 6½ sq. centimetres	(accurately	6.45)
1 sq. yd. = ⅘ sq. metre	("	0.836)
1 sq. centimetre = $\frac{1}{6}$ sq. in.	("	0.155)
1 sq. metre = 10¾ sq. ft.	("	10.76)

Super of a Skew Lead Flat with Parallel Sides.

The super of the end of a thick book like a London Directory is, of course, measured (neglecting the slight curve of the back and edges) by multiplying together the length and height; and if the book be pushed over at the top, though its shape be altered, the area will remain the same. Hence it follows that the area of any parallel-sided skew figure may be measured by multiplying the length of one side by the length of a line at right angles stretching to the opposite parallel side, as A B and C D **Fig. 1.**

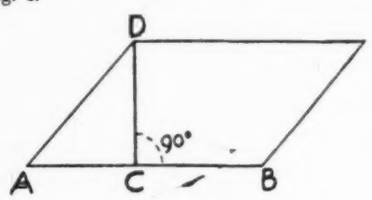


FIG. I.

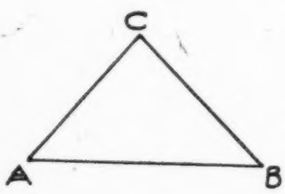


FIG. II.

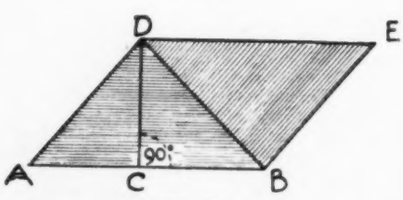


FIG. III.

Super of a Triangular Flat.

If it is required to find the area of a three-cornered surface, such as Fig. 2, which may have any angles, imagine another exactly similar triangle placed next it so that the two form a skew parallel sided flat as Fig. 3, thus: B D E in Fig. 3 being this second triangle. Then, as in Fig. 1, the area of the whole will be found by multiplying the length of A B by C D; hence the triangle A B C will be half this. Thus the super of any triangle can be found by multiplying the length of any side by the length of a line drawn from the opposite corner to cut this side at right angles, and halving the result.

[Other Areas Found by Triangles.]

It often happens that lead and copper have to cover irregular areas with straight sides. In such cases the super is best found by dividing the area into triangles, measuring each and adding these areas together as Fig. 4, which

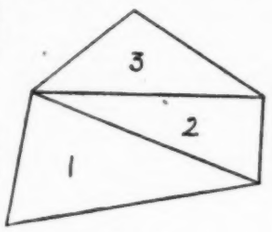


FIG. IV.

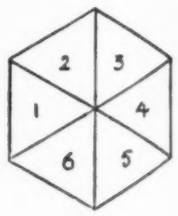


FIG. V.

shows an area divided into three such triangles. If all the sides are equal, trouble may be saved by dividing the area into equal triangles with their points all touching at the centre, when, of course, it is only necessary to measure one triangle and multiply by the total number, as, for instance, in the hexagon shown in Fig. 5.

Super of a Circle.

Very roughly a circle can be supered by making over it a square of about the same size

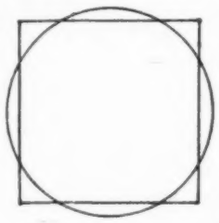


FIG. VI.

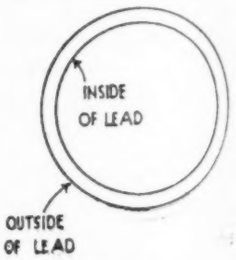


FIG. VII.

(Fig. 6) and measuring the square, but accurately the area is obtained by multiplying the length of the radius by itself (*i.e.*, squaring it), and the result by 3½ (or 3.14). If the centre of the circle is not marked, half the diameter gives the radius. This rule may be used to find the super of a ring such as lead on the coping of a circular parapet. First find the super of the whole circle having the outside of the lead as its edge and then that of the circle with the inside of the lead as its edge; on subtracting this area from the former, the difference must be the super of the lead (Fig. 7). Of course, if the coping only forms a semi-circle the area will be half the above, and so on.

Super of a Cylinder.

The super of a cylinder (a round pipe or column) is obviously equal to that of a piece of paper which would just wrap round it, one edge of which will be the same as the length of the cylinder and the other that of the circumference of the circle presented by the end of the cylinder, already stated as 3½ times the diameter. The height of the cylinder multiplied by the circumference therefore gives the super.

Super of a Cone.

It can be shown that the super of a cone with a circular base is found by multiplying together

its height on the slant by the radius of the base, and this result by 3½ (Fig. 8). If only part of a cone is to be covered, such as Fig. 9, then the cone must be imagined completed, the super of the whole measured and from this the super of

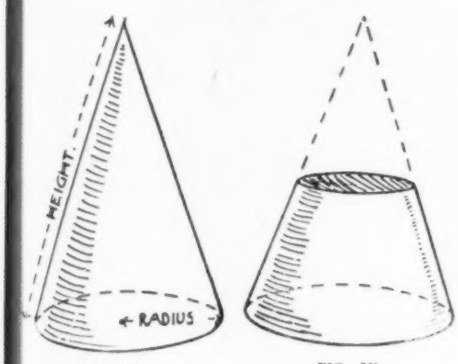


FIG. VIII. FIG. IX.

the added part regarded as a separate cone, then subtracted.

Super of a Ball or Dome.

A ball or sphere may be regarded as a series of small slices of cones, and its super is found by multiplying its circumference (3½ times its diameter) by its diameter again, or it can be found by multiplying the area of the largest circle it could produce in section by 4, which is convenient for taking dimensions off drawings. A dome which is a semi-sphere has, of course, half this area.

THE LONDON COUNTY COUNCIL.

The fortnightly meeting of the London County Council was held on Tuesday in the County Hall, Spring-gardens, S.W., the Marquis of Crewe, Chairman, presiding.

South Eastern and London, Chatham and Dover Railways Bill.—The Chairman of the Improvements Committee submitted a report recommending that no opposition should be offered to the insertion in the South-Eastern and London, Chatham and Dover Railway Companies' Bill of a clause providing that the Company should not execute any works other than those authorised by the Bill for the purpose of improving Charing Cross Station. Mr. Andrew Taylor moved as a rider that the railway companies should be informed that the Council held them to the assurance which they gave on April 20 last before the House of Commons Committee that the arrangement whereby a strip of land required for the widening of the Strand should be surrendered to the Council should not be prejudiced by the Company's Bill now before Parliament. Mr. Gibson seconded, and after some discussion the recommendation and rider were adopted.

Premises licensed for Public Entertainment—Alterations, &c.—The Council has approved the arrangements indicated with respect to the undermentioned premises:—Alexandra Theatre, Stoke Newington, provision of temporary rewinding room; Alhambra Palace of Varieties, reconstruction of electrical installation; Australia House, heating and ventilating arrangements for cinematograph hall in basement; 383-5, Brixton-road, provision of a waiting space; Brixton Skating Rink, additions to premises; Church-street, Greenwich (Empire Cinema), alterations to cinematograph enclosure and ventilating arrangements; 280, Edgware-road, alterations to front entrance; Gatti's Music Hall, provision of re-winding room; 7, High-street, Islington, addition of manager's office; 24-26, High-street, Peckham, installation of hot-water radiators; London Coliseum, installation of organ and provision of staircase to limelight room; London Opera House, provision of temporary projection and re-winding room; Prince's Restaurant, alterations to entrances; 164, Rye-lane, Peckham, alterations to entrance hall; Theatre Royal, Drury-lane, reconstruction of wardrobe room.

RATES OF WAGES IN THE BUILDING TRADE.

THE following are the present rates of wages in the Building Trade in the principal towns of England and Wales. It must be understood that, while every endeavour is made to ensure accuracy, we cannot be responsible for errors that *may* occur:—

	Masons.	Bricklayers.	Carpenters, Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Masons' Labourers.	Bricklayers' Labourers.	Plasterers' Labourers
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Aberdare	11	11	11	11	11	10½	9½	8	8	8
Accrington	11	10½	10	9½	9	10	9½	7	7	7
Altrincham	9½	1/1	1/1	10	8½	11½	11½	7	8	7½
Ashton-under-Lyne	1/-	1/1	1/0½	1/-	1/-	1/-	11	8	8	9
Barnsley	10½	11½	10½	10½	9	10½	9½	8½	8½	8½
Barrow-in-Furness	11½	11½	11½	1/-	11½	11½	11	8	8½	8½
Barry	1/-	1/-	1/-	1/-	—	1/-	11	9	9	9
Bath	9	9	9	8½	8½	9	8	8½	8½	8½
Bedford	8	8	9	8½	8	9	8½	8½	8½	8
Birkenhead	1/-	1/-	1/1	1/1	1/-	1/-	11	9	9	9
Birmingham	11½§	11½§	11½§	11½§	11½§	11½§	10½†	8½§	8½†	8½§
Bishop Auckland	9	9	10	9½	11	9	8	8½	8½	7½
Blackburn	10½	11½	11½	11	10½	11	10½	7½	8	8
Blackpool	11	11	11	9½	8½	9½	9½	8	8	8
Bolton	11½	1/-	1/-	11½	11½	1/-	11½	7½	7½	7½
Bournemouth	8½	10	10	10	8½	10	9½	7½	7½	7½
Bradford	1/-	1/-	11½	11†	10†	10†	10½†	9½	9½	9½
Bridgwater	8½	8½	8½	8½	8½	8½	8	4	4	4
Brighton	9½	9½	9½	9½	—	9½	8	7	7	7
Bristol	11	11	11	11	—	11	10	8	8	8
Burnley	11	10½	10½	10½	9	10½	10½	7	7½	7½
Burton-on-Trent	9½	10½	10½	10	9	10½	9½	7½	7½	7½
Bury	1/-	1/-	11½	11	11	11½	10½	8	8½	8½
Cambridge	9½	9	9	9½	9½	9½	7½	6	6	6
Cardiff	1/-	1/-	1/-	1/-	1/-	1/-	11	9	9	9
Chatham	9½	10	10	9½	9½	10	8½	7	7	7
Chelmsford	8	7½	8½	9	—	7½	8½	5	5	8½
Cheltenham	9½	9½	9½	9½	—	9½	9½	8½*	8½*	8½
Chester	10½	11	11	11	11	11	10	8½	7½	7½
Chesterfield	9	10½	10	8	9	8½	8½	7½	8½	8½
Colchester	8	8½	8½	9	8	9	8	5½	5½	8½
Coventry	1/-	1/-	1/-	1/-	1/-	1/-	11	9½	9½	10
Crewe	9	9½	9	10½	10	9½	10	7	7	7½
Darlington	11½	11½	11½	11½	10	9½	9	8½	8½	8½
Derby	11	11	11	11	11	10½	9½	8	8	8½
Doncaster	9½	10½	10½	9½	9½	9	8	8½	8½	8½
Dudley	9½	11	11	10	10	9½	8½	8	8	8½
Durham	9½	9½	9½	9½	10	9	8½	8½	8½	7
East Glam. and Mon. Valleys	10	10	10	10	—	—	9	7	7	7
Exeter	9½	9½	9½	9½	9½	9	8½	8	8	8
Folkestone	8½	9	9	9½	8½	9	8	7	7	7
Gloucester	8	9½	9½	8½	8½	9½	8½	7	7	7
Grantham	8	8	7½	7½–8	7½–8	8½	8½	5	5	5
Grays	—	11	11	—	—	11	9½	9	9	9
Grimsby	9	10	10½	9½	10	10	9	8	8	8
Great Yarmouth	8	8	8	—	8	8	8½	5	5	—
Halifax	11½	11½	11½	9	9	11	10	8	8	8
Harrogate	10½	9½	10	9	8	10	9½	7½	7½	7½
Hartlepools	11½	1/-	1/-	1/-	11	10½	9	8½	8½	9
Hastings	8½	8	8	8½	8	8	7	6½	8½	8½
Hereford	10	10	10	10	10	10	9	7½	7½	7½
Huddersfield	1/-	11	11½	9½	11	9	8½	9	9	9
Hull	11½	11½	11½	11½	11½	1/-	9	9½	9½	9½
Ipswich	9½	9½	9½	10	9½	10	8	7	7	7
Lancaster	10½	10½	10	10	9½	10	9	8	8½	7½
Leamington Spa	9	9½	9½	8½	9	9½	8½	8½	8½	8½
Leeds	1/0½	1/0½	1/-	11½	11½	1/-	10	9½	9½	9½
Leicester	11½	11½	11½	11	11	10½	9	8½	9	9½
Lincoln	9	9½	9½	9	8½	8½	8	6	8½	8½
Liverpool	1/1	1/1	1/1	1/0½	1/0½	1/-	11½	9	9	9
Llanelly	9½	9½	9½	8½	9	8½	8	8½	8½	8½
London	1/1½	1/1½	1/1½	1/1½	—	1/2	11	10*	10	10
Loughborough	9	9½	9½	9	9	9	8½	7½	7½	8
Luton	9½	10½	10½	8½	9	8½	9½	8½	8½	8½
Maidstone	10	10	10	10	10	10	9	7	7	7
Manchester	1/1	1/1	1/1	1/0½	11	1/1	11½	9	9	9
Mansfield	8½	11	10½	8½	—	10½	9	8	8	8
Merthyr Tydfil	11	11	11	11	11	11	10	8½	8½	8½
Middlesbrough	11½	1/-	1/-	1/-	11	10½	9	8½	8½	9
Newcastle-on-Tyne	1/0½	1/0½	1/0½	1/0½	11	10½	11	9½	9½	9½
Newport, Mon.	11½	11½	11½	11½	11½	1/0½	10½	8½	8½	8½
Northampton	11	11	11	11	11	11	10	8½	8½	8½
Norwich	8½	8½	8½	8½	8	8½	7½	6	6	6
Nottingham	1/-	1/-	1/-	11½	11½	1/1	11½	9½	9½	10
Oldham	1/-	1/-	1/0½	11½	11	11½	11½	8½	8½	9
Oxford	9½	9	9	9	8	9	8	6½	6½	6½
Plymouth	10*	10*	10*	10*	10*	10*	8½*	7*	7*	7*
Pontypridd	11	11	11	11	11	11	9½	8	8	8
Portsmouth	10½	10½	10½	10½	10½	9½	8½	8	8	8
Preston	10½	1/-	11	10½	10½	11	10½	7½	8	8
Reading	9	9½	9½	10½	—	9½	8½	6½*	8½*	8½
Rochdale	11½	11½	11½	10	10½	1/0½	11	8	8½	8½
Rochester	8	10	10	9	9	10	8½	7	7	9
Rugby	11	11	11	11½	1/-	11	10	8	8	9
St. Albans	10	10	10	10	10	10	9	7½	7½	7½
St. Helens	1/-	1/-	1/-	1/-	1/-	11	10½	7	7½	8
Scarborough	9	9½	9	8½	8	9	8	7	7	7
Sheffield	10½	11½	1/-	9½	10½	1/-	10	9	9	9
Shrewsbury	8½	9½	9½	9½	—	8½	7	6½	6½	8½
Southampton	11½	11½	11½	11½	11½	11½	10½	8½	8½	8½
Southend-on-Sea	9	9	9	9	P'cework	9	7	6	6	8½ 6
Southport	11½	11	11½	11	11	11	11	7	7½	7½
South Shields	1/0½	1/0½	1/0½	1/0½	11	10½*	11	9½	9½	9½
Stockport	1/1	1/0½	1/0½	11½	10½	1/-	9½	8	8	8
Stockton-on-Tees	11½	1/-	1/-	1/-	11	10½	9	8½	8½	8
Stoke-on-Trent	10	10½	10	10	—	10½	10½	7	7	7½
Stroud	9	9	9	9	9	9	8½	7	7	7
Sunderland	1/-	1/-	1/-	11½	11	9½	11	9	9	9*
Swansea	1/-	1/-	1/-	1/-	1/-	1/-	11½	9	9	9
Taunton	8	8	8	8	—	8	7	5½	5½	5½
Torquay	8	8	8	8	8	8	8	6	6	8
Wakefield	10	11	10½	9½	8½	10½	10	9	9	9
Walsall	11½	11	11	11	11	11	9½	8½	8½	8½
Warrington	8½	11½	11	11½	8½	11	10	7	7½	7½
West Bromwich	11	11	10½	10½	—	10	9	8	8	8
Wigan	11½	1/-	11½	11	10½	11½	10½	9	9	9
Windsor	9	9	9	10	—	9	—	6	6	6
Wolverhampton	1/-	1/-	1/-	11	11	1/-	10½	9	9	9
Worcester	9	9½	9½	9½	9½	9½	8½	7½	7½	7½
York	9½	9½	9½	10½	10	10½	8½	8½	8½	8½

The Masons' rate given is for bankers; fixers usually ½d. per hour extra.
War bonus of 2s. per week granted. † War bonus of 3s. per week granted. ‡ War bonus of 3s. 6d. per week granted.
War bonus of 6s. per week granted. § ½d. per hour extra for men engaged on munition work.

PROPOSED NEW BUILDINGS AND OTHER WORKS.*

In these lists care is taken to ensure the accuracy of the information given, but it may occasionally happen that, owing to building owners taking the responsibility of commencing work before plans are finally approved by the local authorities, "proposed" works, at the time of publication, have been actually commenced. Abbreviations:—T.C. for Town Council; U.D.C. for Urban District Council; R.D.C. for Rural District Council; E.C. for Education Committee; L.G.B. for Local Government Board; B.G. for Board of Guardians; L.C.C. for London County Council; B.C. for Borough Council; and P.C. for Parish Council.

BIRMINGHAM.—The Public Works Committee of the Birmingham City Council have had under consideration proposals for reconstructing the sewers of the city. A scheme which had been elaborated was held back on account of the war, but part of that scheme related to Hockley main sewer, and, as the defective condition of that sewer has become dangerous, the question of its reconstruction demands immediate settlement. The committee has decided to lay that particular part of the scheme before the Council, and recommend that it be undertaken forthwith. The defective portion of sewer which it is proposed shall be reconstructed is about half a mile in length, in the neighbourhood of Cheston-road, between Thimblemill-lane and Chester-street. This reconstruction will necessitate the deepening of Hockley Brook between Plume-street and Newtown-row, and this work, it is suggested, must be carried out at the same time. The total cost of the reconstruction of the sewer and the deepening of the stream embraced in this part of the scheme is estimated at £100,000 to £120,000.

CHADDERTON.—Plans have been passed for a new Roman Catholic church of temporary structure. The building proper will be erected later.

DUNDEE.—Plans lodged at the office of the City Engineer:—Burnett-street, alterations on property for Peter R. Johnston; Douglas-street, alteration on property for And. Mitchell & Co., Ltd.; Rockwell-place, addition to works for the Boase Spinning Co., Ltd.

EAST STOW.—The R.D.C. has decided that the Clerk be authorised to make inquiries from owners of land in the district as to what sites were suitable for the erection of workmen's dwellings, and that Mr. A. H. Hunt, of Bury St. Edmund's, be appointed architect, and submit particulars in regard to the proposed dwellings.

GLASGOW.—The following linings have been granted at Glasgow Dean of Guild Court: A. B. Macfie & Co., Ltd., structural engineers, 50, Charles-street, St. Rollox, to erect an iron and timber shed there; Woodside Engineering Co., Ltd., 50, Wellington-street, to build a factory in Balmore-street; Sir W. G. Armstrong, Whitworth & Co., Ltd., Petershill-road, to erect buildings there; Sir Joseph P. Maclay, Bart., shipowner, Glasgow, and Miss Lilias Maclay, Duchal, Kilmacolm, to make alterations on present building for hostelry for students at Southpark House, Ann-street, Hillhead; Smith's Glasgow Crucible Co., Ltd., 101, Fauldhouse-street, to extend their works there; William Beardmore & Co., Ltd., to make additions to works in Old Edinburgh-road and East Hope-street.

HAMMERSMITH.—Drainage plans passed by the B.C.:—At 47, Southerton-road, for Mr. H. Quilter; at 143, Great Church-lane, for Mr. A. L. C. Fell; at factory, Wood-lane, for Mr. W. E. Blake; at the Glacier Anti-Friction Metal Co., for Mr. W. E. Tamlin; at 182, Dalling-road, for Messrs. W. R. & A. Hide.

LONDON.—The City Corporation has received an application from Mr. H. T. Smith on behalf of the Times Cold Storage Co., Ltd., for permission to construct a bridge across Hayne-street, Long-lane. The Corporation is being asked for authority to expend a sum not exceeding £250 on repairs urgently required to the surfaces of the stairs and balconies of Block 1–8, Corporation-buildings, Farringdon-road. The L.C.C. have approved plans of a proposed new theatre of varieties in Warwick-street and Golden-square, W.

MARKET HARBOROUGH.—The Surveyor has been instructed to tar-paint Farndon-lane and Melton-lane, in addition to those usually done. The plans for additions to boot factory for Mr. G. Looms, Cross-street, have been approved.

NUNEATON.—The Housing and Town Planning Committee has reconsidered the scheme for the erection of forty-nine houses in the new road to be called Bath-road, which was adopted by the Council in 1914. The Committee recommend the Council to amend the scheme so as to provide twelve houses in pairs, semi-detached, and the remainder in blocks of four, a total of forty or forty-two houses instead of forty-nine.

SHEFFIELD.—The City Council has had before it a report presented by the Estates Committee on the housing position in the city, together with a scheme for dealing with the present shortage. Preliminary plans have been prepared for the erection of three groups of working-class houses, as follows: At High Wincobank, 224 houses, 15 to the acre, estimated to cost £85,273; Walkley Hall Estate, Crookes, 200 houses, 13.8 to the acre, estimated cost £77,822; and off Langsett-road, Hillsborough, 117 houses, 20 to the acre, estimated cost £51,181.

STAVELEY.—At a special meeting of the Staveley Council, the engineer submitted plans of the proposed Staveley housing schemes, showing twelve houses to the acre. The schemes were approved.

SWANSEA.—The Acting Borough Architect has been directed to carry out the erection of sheds for water vans, wagons, &c., in the Old Waterworks-yard, Strand, at an estimated cost of £175, and the foundation and surfacing of the carriageway adjoining is to be carried out by the Borough Surveyor's Dept., at a cost of about £70. The Corporation has agreed to the proposal of the Electricity Dept. to construct an electricity main in Neath-road and Mannesmann-road, from Villiers-street to the Mannesmann Works. Plans approved:—Additions to General Hospital, Phillips-parade, for the General Hospital Committee; additions, 32, Hoskins-terrace, Pentregethin-road, for Mrs. Griffiths; Garage, 3, Uplands-crescent, for Mr. J. Nice; Workshop, 6, Ffynone-street, for Messrs. Jones Bros.; additions, 97, Woodfield-street, for Mr. A. E. Edwards. The following plans have been before the Council:—Stable and coach-house, Beattie-street, for Messrs. J. & F. Weaver; alterations, 15, Bathurst-street, for the London and North Western Railway Co.

TOTTENHAM.—It has been agreed to proceed with the scheme of purchasing freehold land and erecting an institute for soldiers and sailors.

WANDSWORTH.—Works approved by the B.C.:—Partial re-drainage of 66, Howard's-lane, Putney, for Mr. G. W. Beattie; partial re-drainage of 46, The Chase, Clapham-common North, for Mr. G. Ferguson; partial re-drainage of 3, Heathfield-gardens, Fairfield, for Mr. W. Stevens; re-drainage of 30, Clapham Park-road, Clapham South, for Messrs. T. Sheppard & Co.; re-drainage of 325, Upper Richmond-road, Putney, for Mr. T. Jones; partial re-drainage of 199, Bedford-hill, Balham, (amended notice) for Mr. A. W. T. Richards; sanitary accommodation at rear of 58, and construction of additional manhole at 60, Warple Way, Fairfield, for Mr. H. O. Carr (on behalf of the Wandsworth, Wimbledon and Epsom District Gas Co.); additions to 29, Charlwood-road, Putney, for Messrs. H. Gibbons & Sons; erection of factory, sanitary accommodation, &c., Bell-lane, Southfield, for Mr. W. Hammond, for Messrs. May & Baker, Ltd.; erection of hall at side of 111, Tooting High-street, for Messrs. Swain & Selley; new shop front and room over at 5, Mitcham-road, Tooting, for Messrs. J. Garrett & Son.

WITHERNSEA.—A town planning scheme is to be prepared for Withernsea.

* See also our list of Competitions, Contracts, &c., on this page.

The Secretaryship, Royal Society of Arts.

At the annual meeting of the Royal Society of Arts last week it was announced that Sir Henry Trueman Wood has tendered his resignation of the Secretaryship as from next September. Sir Henry Wood has held that appointment since 1879. He was officially connected with the Health, Inventions, and Colonial Exhibitions held at South Kensington in 1883–5, and with the Ancient Arts Exhibition, 1911, at Earl's Court; he was a British Commissioner, Paris Exhibition, 1889, and Secretary to the Royal Commission, Chicago Exhibition, 1893. He has written "The History of the Royal Society of Arts" (1913) and a work entitled "Industrial England in the middle of the eighteenth century"—that is, from the foundation, in 1754, of the Royal Society of Arts.

Building Trades Advisory Committee.

The Minister of Labour has appointed the following to form the Building Trades Central Advisory Committee (Employers), which will advise and assist the Employment Department upon matters affecting employers in the building trades in connection with the administration of the Employment Exchanges:—Messrs. J. P. Cox, J.P. (Confederation of National Association of Building Trades Sub-Contractors); F. L. Dove, L.C.C. (the National Federation of Building Trade Employers); S. Easton, J.P. (National Federation of Building Trade Employers); A. J. Forsdike (National Federation of Building Trade Employers); T. Foster (National Association of Master House Painters and Decorators of England and Wales); Joseph T. M'Arthur (Association of Master Painters in Scotland); T. M'Hugh (National Federation of Building Trade Employers); J. Storrs, J.P. (National Federation of Building Trade Employers); H. H. Spittal (Scottish National Building Trades Federation); W. F. Wallis, J.P. (National Federation of Building Trade Employers); H. Willcock (National Federation of Building Trade Employers).

The Committee at their first meeting at the Employment Department, were welcomed by Mr. C. F. Rey, Director of the Employment Department, who explained the system of local and national committees which were being set up in connection with the Employment Exchanges. The Committee elected Mr. J. Storrs, J.P., as chairman, and Mr. F. L. Dove as vice-chairman, and then considered, among other questions, the best method of avoiding delay in placing men through the Employment Exchanges and the proposal that a Central Building Trades Exchange should be set up for the London area.

Competitions, Contracts, &c.

For some contracts still open, but not included in this List, see previous issues. **Those with an asterisk (*) are advertised in this number.** Contracts, iv; Tenders, —; Public Appointments, XVIII; Auction Sales, xviii. Certain conditions beyond those given in the following information are imposed in some cases, such as that advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bona-fide tender unless stated to the contrary.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders may be sent in.

***It must be understood that the following paragraphs are printed as news, and not as advertisements; and that while every endeavour is made to ensure accuracy, we cannot be responsible for errors that *may* occur.

BUILDING AND PAINTING.

JULY 23.—**Chester.**—PAINTING, &C.—For painting and decorating the exterior and interior of the Children's Home, Upton, near Chester. Forms from the Superintendent.

JULY 25.—**London.**—CLEANING AND DISTEMPERING, &C.—The Metropolitan Asylums Board invite tenders for internal cleaning and distempering and external painting at the Eastern Fever Hospital, The Grove, Homerton, E. 9. Specification by Mr. T. Cooper, M.Inst.C.E., M.I.Mech.E., Acting Engineer-in-Chief, at the Office of the Board, Embankment, E.C. Deposit, £1.

JULY 25.—**Salford.**—PAINTING, &C.—The Guardians invite tenders for painting and decorating in certain wards of the Hope Auxiliary Military Hospital. Specification of Mr. E. H. Inchley, Clerk to the Guardians, Poor Law Offices, Eccles New-road, Salford.

JULY 25.—**Leeds.**—PAINTING.—For the painting wrok required for the Parks Committee at various parks, recreation grounds, and cemeteries. Specifications, &c., of Mr. W. T. Lancashire, City Engineer, Municipal Buildings, Leeds.

JULY 25.—**Canterbury.**—BUILDING.—For the erection of a proposed isolation building at the Kent and Canterbury Hospital, Longport-street, Canterbury. Plans of Messrs. Jennings & Gray, Architects, Canterbury.

JULY 26.—**Blackpool.**—ALTERATIONS.—For proposed alterations to the Church of England Mortuary Chapel at the Cemetery. Specification from Mr. John S. Brodie, Borough Engineer, Municipal-buildings, Town Hall, Blackpool.

NO DATE.—**Cookstown (Ireland).**—IMPROVEMENTS, &C., for sundry improvements and additions to Dunamore Church, Kildress, Cookstown, for the Rev. John MacDonnell, P.P. Plans, &c., from Mr. J. J. M'Donnell, F.R.I.A.I., Architect, 27, Chichester-street, Belfast.

FURNITURE, MATERIALS, etc.

*JULY 27.—**Hornsey.**—Hornsey Town Council invite tenders for the supply and fixing of a new sectional boiler and additional radiators at the Highgate Council School, North Hill, Highgate. Particulars from A. W. Allen, the Secretary for Education, 206, Stapleton Hall-road, Stroud Green, N. 4.

ROAD, SANITARY, AND WATER WORKS.

JULY 20.—**Manchester.**—EXTENSION OF CARRIAGEWAY.—The Paving, Sewering and Highways Committee of the Corporation invite tenders for the extension of granited rock asphalte carriageway, on concrete bed, in Palatine-road, West Didsbury, for a length of about 233 yards south of Dene-road. Forms, &c., at the Paving, &c., Department (District Surveyor's Office), Town Hall, Manchester.

JULY 20.—**Manchester.**—WATER-PIPES.—Supply to the Corporation Waterworks Committee of about 18 tons of cast-iron water pipes, 6 ins. diameter, with about two tons of special castings. Specifications, &c., of the Secretary, Waterworks Offices, Town Hall, Manchester.

AUGUST 7.—**Beaconsfield.**—Tenders are invited by the U.D.C. of Beaconsfield for the following repairs:—To lay and steam roll about 3,270 yds. super of ballast, to lay and roll 4,720 yds. super of clinkers, and other attendant works. Forms of tender, &c., from the Surveyor's office, Council Hall, Beaconsfield.

Public Appointments.

*Applications for the vacant Curatorship of the Soane Museum are invited by the President and Council of the Royal Academy. Particulars can be obtained from the Curator-in-Charge at the Museum, 13, Lincoln's Inn-fields, W.C.

PRICES CURRENT OF MATERIALS.

[Owing to the exceptional circumstances which prevail at the present time, prices of materials should be confirmed by inquiry.—Ed.]

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the highest or lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

Per 1,000 Alongside, in River Thames.	£ s. d.
Best Stocks	2 5 0
Picked Stocks for Facings	2 17 0

Per 1000, Delivered at Railway Depot, London.

	£ s. d.		£ s. d.
Flettons	1 18 0	Best Blue Pressed Staffordshire	5 15 0
Best Fareham Red	3 15 0	Do. Bullnose	6 0 0
Best Red Pressed Ruabon Facing	6 0 0	Best Stourbridge Fire bricks	9 5 0

GLAZED BRICKS—

Best White, Ivory, and Salt Glazed Stretchers	14 17 6	D'ble Str'tch'rs	20 7 6
		D'ble Headers	17 7 6
		One Side and two Ends	21 7 6
Headers	14 7 6	Two Sides and one End	22 17 6
Quoins, Bullnose and 4½in. Flats	18 7 6	Splays and Squints	19 17 6

Glazed bricks priced at so much each, 25 per cent. advance on list.

Second Quality, £1 per 1,000 less than best.

	s. d.	
Thames Ballast	8 3	per yard, delivered.
Pit Sand	10 0	
Thames Sand	11 0	„ „ „
Best Washed Sand	11 0	„ „ „
½in. Shingle for Ferro-Concrete	10 0	„ „ „

Per ton, delivered.

	£ s. d.		£ s. d.
Best Portland Cement	2 10 0	..	2 13 0

Do. £2 6s. alongside in 80-ton lots.
Ferrocrete 2s. 6d. per ton extra on above.
Best Ground Blue Lias Lime 1 7 6 at rly. depot.
NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.
Grey Stone Lime ..... 47s. 0d. per ton delivered.
Stourbridge Fireclay in s'cks 37s. 6d. per ton at rly. dpt.

STONE.

	s. d.
BATH STONE—delivered in railway trucks at Westbourne Park, Paddington, G.W.R., or South Lambeth, G.W.R., per ft. cube	1 7
Do. do. delivered in railway trucks at Nine Elms, L. & S.W.R., per ft. cube	1 8½
Do. do. delivered on road waggons at Nine Elms Depot	1 9½
PORTLAND STONE—Brown Whitbed, in random blocks of 20 ft. average, delivered in railway trucks at Westbourne Park, G.W.R., South Lambeth, G.W.R., or Nine Elms, or L. & S.W.R., per ft. cube	2 5½
Do. do. delivered on road waggons at Pimlico Wharf or Nine Elms Depot, per ft. cube	2 6½

White basebed, 2d. per ft. cube extra.

RANDOM BLOCKS—Per Ft. Cube, delivered at Rly. Dpot.

	s. d.		s. d.
Ancaster in blocks	2 0	Closeburn Red Freestone	2 2
Beer in blocks	1 7½	Red & White Mansfield random block	2 9
Grinshill in blocks	2 4	Yellow Magnesian Limestone do. do	3 3
Darley Dale in blocks	2 5		

YORK STONE—*Robin Hood Quality.*

Per Ft. Cube, Delivered at Railway Depot	s. d.
Scappled random blocks	3 4

Per Ft. Super. Delivered at Railway Depot.

6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 5
4 in. rubbed two sides, ditto	2 8
3 in. sawn two sides slabs (random sizes)	1 0½
2 in. to 2½ in. sawn one side slabs (random sizes)	0 8½
1½ in. to 2 in. ditto, ditto	0 6½

HARD YORK—

Per Ft. Cube, Delivered at Railway Depot.	
Scappled random blocks	3 0

Per Ft. Super., Delivered at Railway Depot.

6 in. sawn two sides landing to sizes (under 40ft. super.)	2 3
6 in. rubbed two sides ditto	2 7
3 in. sawn two sides slabs (random sizes)	1 0
2 in. self-faced random flags	0 5

TILES.

	Per 1,000 f.o.r. London. £ s. d.
Best machine-made tiles or hand-made sand-faced tiles from either Broseley or Staffordshire district	3 0 0
Ornamental ditto	3 2 6
Hip and valley tiles (per dozen)	0 6 0

SLATES.

	Per 1,000 of 1,200 f.o.r. London. £ s. d.
Best Blue Bangor Slates, 20 by 10	13 5 0
„ „ 16 by 8	6 12 6
First quality „ 20 by 10	12 15 0
„ „ 16 by 8	6 10 0
Best Blue Portmadoc 20 by 10	13 5 0
„ „ 16 by 8	6 12 6
First quality „ 20 by 10	12 12 6
„ „ 16 by 8	6 7 6

WOOD.

BEST BUILDING REDWOOD. Imported sizes.

Deals: 4 in. by 12 in., 4 in. by 11 in., 3 in. by 11 in., 4 in. by 9 in., and 2 in. by 11 in. ..... 3 in. by 9 in., 2½ in. by 9 in., and 2 in. by 9 in. .....

Softwood stocks controlled by the Director of Materials, consequently prices must be withdrawn

WOOD (*Continued*).

BEST BUILDING REDWOOD.

Battens: 2 in., 2½ in., and 3 in. by 8 in. ..... 2 in., 2½ in., and 3 in. by 7 in. ..... 2 in., 2½ in., and 3 in. by 6 in. .....

Scantlings: 2 in. by 3 in., 2 in. by 3½ in., 2 in. by 4 in., 2 in. by 4½ in. .... 3 in. by 4 in., and 3 in. by 4½ in. .....

Boards: 1 in., 1¼ in., and 1½ in. by 6 in. and 7 in. ½ in. .....

Seconds .....

Sawn pitch pine logs (about 35 cu. ft. average .....

Do. 6 in. to 10 in. ..

Best Pitch Pine Deals ....

Under 2 in. thick .....

JOINERS' WOOD.

White Sea First Quality Red: 4 in. by 11 in... 3 in. by 11 in., and 2 in. by 11 in. ..... 4 in. by 9 in. ..... 3 in. by 9 in., and 2½ in. by 9 in. ..... 3 in. by 11 in. boards .. 7 in. and 8 in. battens .. 7 in. and 8 in. boards ...

Softwood stocks controlled by the Director of Materials, consequently prices must be withdrawn.

Archangel White Deals—

Best 3 in. by 9 in. and 10 in. and 11 in.			
Seconds, do.			
U.S. Battens			
Prepared Floorings and Matchings. Seconds Swedish Red and equal—1½ in. by 6½ in. planed and shot			
1½ in. by 6½ in. planed and matched			
1 in. by 6½ in. planed and shot			
1 in. by 6½ in. planed and matched			
⅞ in. by 6½ in. planed, matched, and beaded, or V jointed			
1 in. by 6½ in. do.			
Columbian or Oregon Pine, best quality			
Yellow Pine—First regular sizes			
Oddments			
Seconds, regular sizes ..			
Oddments			
Kauri Pine—Planks per ft. cube			
Dry Wainscot Oak, per ft. super, as inch	0 1 0	..	0 1 6
⅛ in. do. do.	0 0 10	..	0 1 2
Dry Mahogany—Honduras, Tabasco, per ft. super, as inch	0 1 6	..	0 2 6
Cuba, Mahogany	0 1 6	..	0 2 6
Dry Walnut, American, per ft. super, as inch	0 1 6	..	0 2 6
French, "Italian," Walnut	0 1 6	..	0 2 6
Teak, per load (Rangoon or Moulmein)	30 0 0	..	40 0 0
Do. do. (Java)	30 0 0	..	40 0 0
American Whitewood planks, per ft. cube	0 8 6	..	0 10 0
Glue, per cwt.	5 0 0	..	5 5 0

METALS.

JOISTS, GIRDERS, &c.

Rolled Steel Joists, ordinary sections, basis price ..... Plain Compound Girders, ordinary sections ..... Plain Compound Stanchions Angles, Tees, and Channels, ordinary sections ..... Flitch Plates ..... Cast Iron Columns and Stanchions, plain ordinary patterns .....

Prices controlled by the Ministry of Munitions.

WROUGHT-IRON TUBES AND FITTINGS—

(Discount off List for lot of not less than £4 net value delivered direct from works. 5 per cent. less carriage forward if sent from London stocks.)

	Tubes.	Fittings.
Gas	45	50
Water	40	47½
Steam	35	45
Galvanised gas	27½	42½
„ water	18½	40
„ steam	12½	37½

L.C.C. SOIL PIPE—

	Pipes Coated. s. d.		Bends. s. d.		Branches. s. d.
2 in. per yd.	2 8	....	2 1	each	2 6
2½ in. „ „	3 1	....	2 4	„	3 2
3 in. „ „	3 10	....	2 6	„	3 9
3½ in. „ „	4 2	....	3 2	„	4 4
4 in. „ „	4 8	....	3 6	„	5 0

RAIN-WATER PIPES, &c.

	Pipe. s. d.		Bends. s. d.		Branches. s. d.
2 in. per yd.	2 0	....	1 2	each	1 8
2½ in. „ „	2 2	....	1 5	„	2 0
3 in. „ „	2 6	....	1 9	„	2 6
3½ in. „ „	3 0	....	2 1	„	3 0
4 in. „ „	3 3	....	2 6	„	3 8

L.C.C. DRAIN PIPES,—9 ft. lengths. London Prices.
4 in., 5s. 3d. .. 5 in., 6s. 3d. .. 6 in., 7s. 6d.

METALS (*Continued*).

Per ton in London.

	£ s. d.		£ s. d.
IRON—Common Bars	16 10 0	to	17 0 0
Staffordshire Crown Bars—good merchant quality	16 10 0	..	17 10 0
Staffordshire "Marked Bars"	17 10 0	..	18 0 0
Mild Steel Bars	19 0 0	..	19 10 0
Steel Bars, Ferro-Concrete quality, £19 basis price.			
Hoop Iron, basis price	20 0 0	..	20 10 0
„ „ Galvanised	33 0 0	..	—

(* And upwards, according to size and gauge.)

Sheet Iron Black—

Ordinary sizes to 20 g.	22 0 0	..	22 10 0
„ „ 24 g.	23 0 0	..	23 10 0
„ „ 26 g.	24 0 0	..	24 10 0
Sheet Iron, Galvanised flat, ordinary quality—Ordinary sizes, 6 ft. by 2 ft. to 7 ft. to 20 g.	32 0 0	..	—
Ordinary sizes to 22 g. and 24 g.	32 0 0	..	32 10 0
Ordinary sizes to 26 g.	35 0 0	..	35 10 0
Sheet Iron, Galvanised, flat, best quality—Ordinary sizes to 20 g.	35 0 0	..	—
„ „ 22 g. and 24 g.	35 10 0	..	—
Ordinary sizes to 26 g.	38 10 0	— ..	—
Galvanised Corrugated Sheets—Ordinary sizes, 6 ft. to 8 ft. 20 g.	31 0 0	—	..
Ordinary sizes, 22 g. and 24 g.	31 10 0	..	—
Ordinary sizes, 26 g.	32 0 0	..	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. to 20 g. and thicker	24 10 0	..	—
Best Soft Steel Sheets, 20 g. and 24 g.	24 15 0	..	—
Best Soft Steel Sheets, 26 g.	26 10 0	..	—
Cut Nails, 3 in. to 6 in.	26 0 0	..	27 0 0

(Under 3 in., usual trade extras.)

LEAD, &c.

Delivered in London.

	£ s. d.		
LEAD—Sheet, English, 4 lb. and up	38 10 0	..	—
Pipe in coils	39 0 0	..	—
Soil Pipe	42 0 0	..	—
Compo pipe	42 0 0	..	—

NOTE—Country delivery, 20s. per ton extra; lots under 5 cwt., 1s. 6d. per cwt. extra. Orders for over 1 cwt. should be accompanied by a certificate or licence, which can be obtained from the Director of Materials [A.N. 2 (E)], Hotel Victoria, S.W.

Allowance for old lead, £26 per ton.

COPPER—Strong Sheet	per lb.	0 1 6	..	—
Thin „	„	0 1 8	..	—
Copper nails	„	0 1 6	..	—
Copper wire	„	0 1 8	..	—
BRASS—Strong Sheet	„	0 1 6	..	—
Thin „	„	0 1 8	..	—
TIN—English Ingots	„	0 2 6	..	—
SOLDER—Plumbers'	„	1 1	..	—
Tinmen's	„	0 1 5	..	—
Blowpipe	„	0 1 7	..	—

GLASS.

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES AND IN SQUARES IN ORDINARY SIZES.

Per Ft.		Per Ft.
15 oz. fourths	5d.	26 oz. thirds 7½d.
„ thirds	5½d.	32 „ fourths 8d.
21 „ fourths	6d.	„ thirds 9d.
„ thirds	6½d.	Fluted Sheet, 15 oz. 6½d.
26 „ fourths	6½d.	„ 21 7½d.

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

Per Ft.	
⅛ Rolled plate	4d.
⅛ Rough rolled and rough cast plate	4½d.
¼ Rough rolled and rough cast plate	4½d.
Figured Rolled, Oxford Rolled, Baltic, Oceanic, Arctic, Stippolyte, and small and large Flemish white	6d.
Ditto, tinted	7d.
Rolled Sheet	5d.
White Rolled Cathedral	5d.
Tinted do.	5½d.

PAINTS, &c.

	£ s. d.
Raw Linseed Oil in pipes per gallon	0 5 2
„ „ „ in barrels „	0 5 3
„ „ „ in drums „	0 5 6
Boiled „ „ in barrels „	0 5 6
„ „ „ in drums „	0 5 9
Turpentine in barrels „	0 4 8
„ in drums „	0 4 11
Genuine Ground English White Lead, per ton (In not less than 5 cwt. casks.)	53 10 0
GENUINE WHITE LEAD PAINT—"Blackfriars," "Nine Elms," "Park," and other best brands (in 14 lb. tins) not less than 5 cwt. lots, per ton delivered	69 0 0
Red Lead, Dry (packages extra) .. per ton	42 0 0

Orders for over 28 lb. of White Lead, White Lead Paint and Red Lead should be accompanied by a certificate or licence, which can be obtained from the Director of Materials [A.N. 2 (E)], Hotel Victoria, S.W.

Best Linseed Oil Putty	per cwt.	0 14 0
Stockholm Tar	per gallon	0 3 6
Filocol	per cwt.	0 11 6

VARNISHES, &c.

Per gallon. £ s. d.	
Fine Pale Oak	0 8 0
Pale Copal Oak	0 10 0
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 6
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 10 0
Finest Pale Durable Copal	0 18 6
Extra Pale French Oil	1 1 0
Eggshell Flatting	0 18 0
White Pale Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 0
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 0
Berlin Black	0 16 0
Knotting	0 16 0
French and Brush Polish	0 12 0

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Wednesday*.

* Denotes *accepted*. † Denotes *provisionally accepted*.
‡ Denotes *recommended for acceptance*.

ABERKENFIG.—For repairs to seven cottages at Alma-terrace, Aberkenfig, for the Earl of Dunraven Lodge of Oddfellows, Bridgend :—

J. Davies	£130
H. Thomas	120
W. T. Howell, Quarella-road, Bridgend	110

BARGOED.—For the laying of a sewer in John-street, Bargoed, for the Gelligaer U.D.C. :—

*W. Jenkins	£51 18 6

CHELMSFORD.—For painting work to parts of the interior and exterior of 106 working-class dwellings, Rainsford-lane, for the T.C. :—

H. Potter	£299 0 0
F. J. French	282 17 6
T. J. Bailey	249 8 3
F. G. Bratchell	199 16 8
*W. E. Wisbey	199 0 0

GOSPORT.—Accepted by the Gosport and Alverstoke E.C., for the renovation of certain schools :—Alverstoke school, C. M. Dash, £56 ; Leesland boys' school, J. Vaux, £33 15s. ; St. Mary's R.C. school, W. T. Sawkins, £28 18s. 6d. ; children's homes, T. E. Gibbons, £28 15s.

GRIMSBY.—For extensions to the Isolation Hospital, Immingham, and painting the whole of the roofs, sides and external woodwork of existing building and new block, for the Grimsby R.D.C. :—

M. Holmes & Co., Ltd.	£319 0 0
A. Waddingham	290 6 0

LEWES.—For the supply of (*a*) 600 tons of 2-in. broken St. Keverne granite ; and (*b*) 150 tons of ¾-in. coarse granite screenings :—

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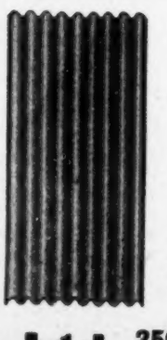
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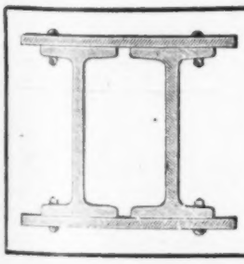

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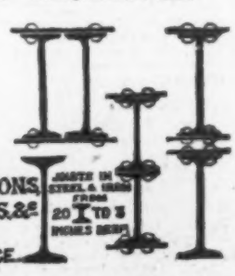

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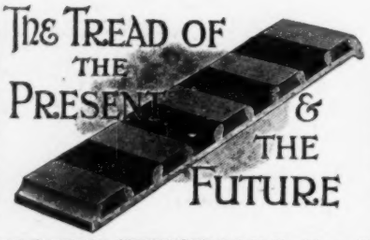

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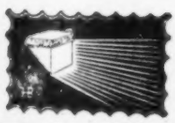

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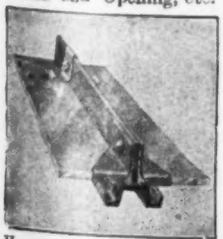

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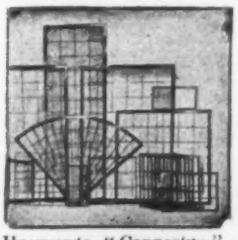

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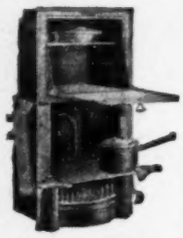

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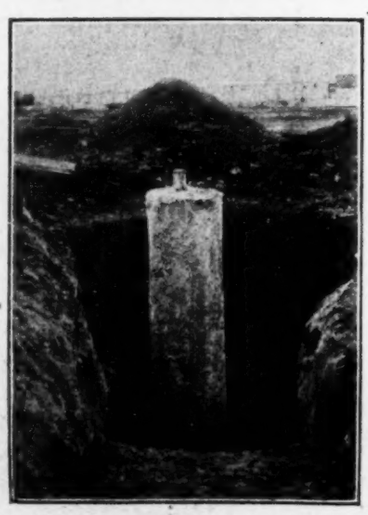

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